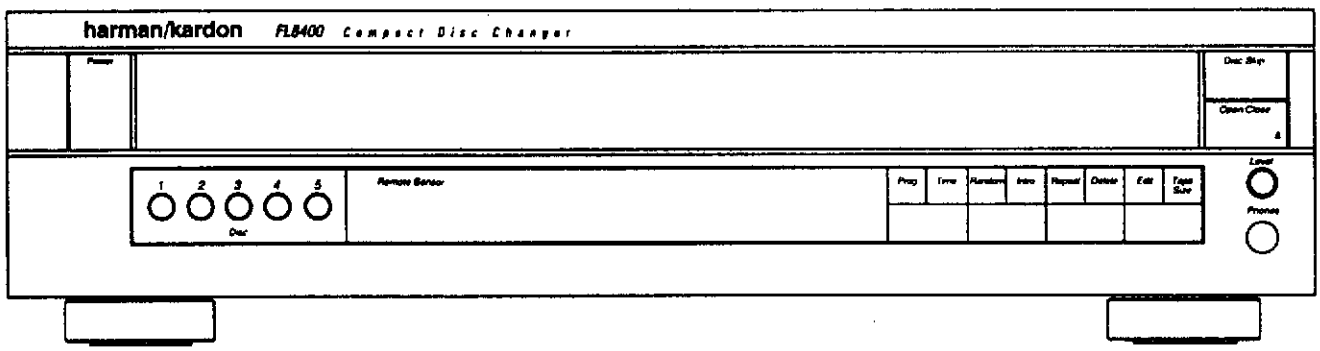
The Harman Kardon
Model FL8400
COMPACT DISC CHANGER

Manual A

Technical Manual



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DANGER: Invisible laser radiation when open and interlock failed or defeated.
AVOID DIRECT EXPOSURE TO BEAM.

harman/kardon

Parts and Service Office
80 Crossways Park West, Woodbury, N.Y. 11797
1112-FL8400A P9501 1500 Printed in Korea

LASER BEAM SAFETY PRECAUTIONS

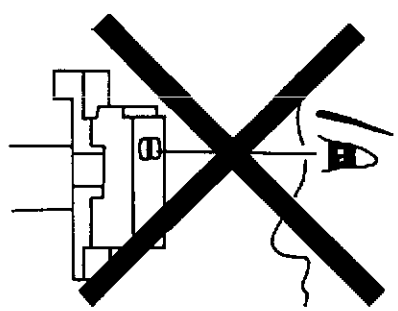
CLASS 1 LASER PRODUCT

CLASS 1
LASER PRODUCT

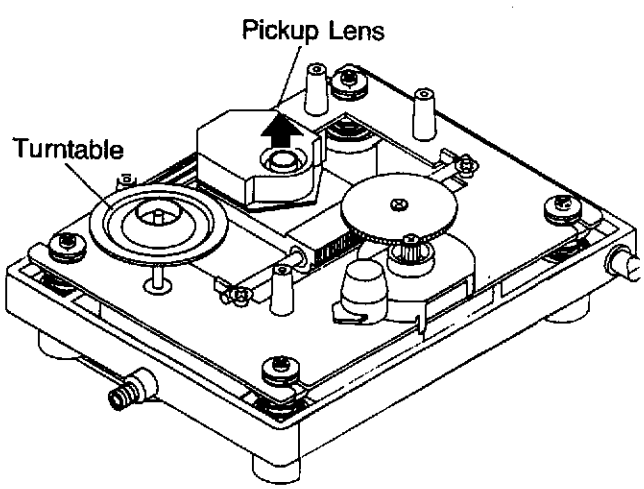
CAUTION
Invisible laser radiation when the unit is open. DO not stare into beam.

CAUTION: USE OF ANY CONTROLS, ADJUSTMENT, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Do not look directly at the laser beam coming from the pickup or allow it to strike against your skin.



This compact disc player uses a pickup that emits a laser beam. The laser beam is emitted from the location shown in the figure. When checking the laser diode, be sure to keep your eyes at least 1 foot away from the pickup lens when the diode is turned on. Do not look directly at the laser beam.



CAUTION:
Using controls and adjustment, or doing procedures other than those specified herein, may result in hazardous radiation exposure.

SAFETY PRECAUTIONS

CAUTION

RISK OF ELECTRIC SHOCK.
DO NOT OPEN.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Attention: Pour prévenir les chocs électriques ne pas utiliser cetre fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames prévent étre insérées à fond sans en laisser aucune partie à découvert.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

HANDLING LASER PICKUP

The laser diode in the optical system of this player can be damaged by electrostatic discharge from your clothes or your body. Proper electrostatic grounding for service personal is required during servicing.

BEFORE REPAIRING THE COMPACT DISC PLAYER

Preparation

- Human Body Grounding:
  Many of the components used in this compact disc player, including the laser pickup, are sensitive to electrostatic discharge. Service personal should be grounded with an electrostatic armband (1 Mohm).

- Caution:
  Static charge on clothing does not escape through a body grounding wrist band.
  Be careful not to contact the pickup or electrical components with your clothing.

- Workbench and Tool Grounding:
  A properly-grounded electroconductive plate (1 Mohm) or metal sheet should be fitted to the workbench surface. Tools and instruments (such as soldering irons and scopes) should be grounded to prevent AC leakage.

Figure 1

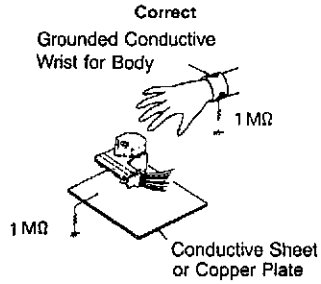


Figure 2

Note: Laser diodes are so susceptible to damage from static electricity that, even if a static discharge does not ruin a diode, it can shorten its life or cause it to work improperly.

LEAKAGE TEST

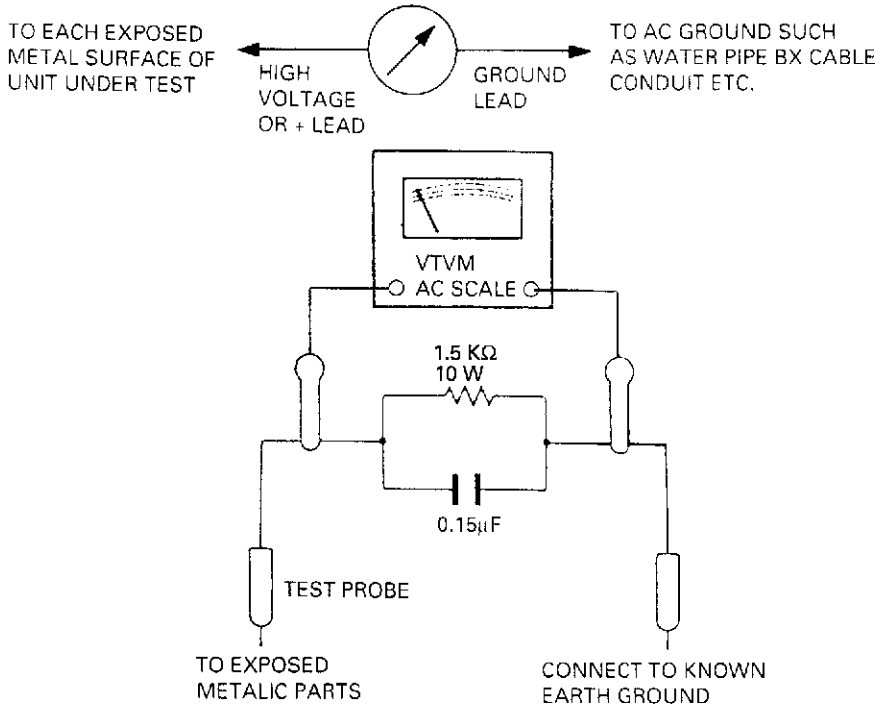
Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to makes certain that leads are not pinched or that hardware is not lodged between the chassis and other metallic parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. Which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item no. 21641, RCA model WT540A or use alternate method as follows: plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation transformer for this test).

Using two clip leads, connects a 1500 ohm, 10-watt resistor paralleled by a 0.15μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 ohms per volt, or higher sensitivity to measure the AC voltage drop across the resistor. (see diagram) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the on and off positions.)

A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.

SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST



SPECIFICATIONS

General

Transmission bit rate ..... 4.3218 Mbit/sec
Transmission on clock ..... 16.9344 MHz
Error correction ..... CIRC C1, C2 double correction

Pickup

System object lens drive type ..... Optical pickup
Object lens drive system ..... 2 dimensional parallel drive system
Optical source ..... Semiconductor AlGaAs laser
Wave length ..... 760-800 nm
Tracking system ..... 3 beam tracking servo type

Others

Digital filter ..... 8 times oversampling type
Analog filter ..... 2 pole RC type
D/A converter ..... 1 bit twin with digital filter.
Power consumption ..... 12 W
Dimensions (HWD) ..... 3.7 × 17.3 × 14.9 inches
95 × 440 × 380 mm
Weight (net) ..... 6.5 kg (14 lbs 5 oz)

Electrical

Test Item	Unit	Nominal	Limit
Output voltage at 1 kHz	V	1.97	1.97 ± 0.2
Distortion and noiser without filter:			
20 Hz	%	0.14	0.2
1 kHz	%	0.029	0.035
10 kHz	%	0.29	0.35
16 kHz	%	0.13	0.45
18 kHz	%	0.13	0.2
20 kHz	%	0.12	0.2
Distortion and noise with filter 30 kHz:			
20 Hz	%	0.04	0.05
1 kHz	%	0.006	0.009
S/N ratio without filter	dB	96	90
S/N ratio with filter 30 kHz	dB	101	100
Dynamic range at 1 kHz	dB	94	90
Frequence responce: (0 dB at 1kHz)			
20 Hz	dB	±0	±0.5
100 Hz	dB	±0	±0.5
10 kHz	dB	±0.15	±0.2
20 kHz	dB	−0.05	±0.1
De-emphasis:			
1 kHz	dB	−0.4	−0.4 ± 0.2
5 kHz	dB	−4.5	−4.5 ± 0.6
16 kHz	dB	−8.75	−8.75 ± 10
Channel seperation	dB	97	90
Channel Balance	dB	0	±0.5
Minimum operation voltage (% of normal supply voltage)	dB	80	85

ENVIRONMENTAL

Test to specification

Temperature between 59° F (15℃) and 95° F (35℃) and relative humidity between 45% and 75%, with power supply voltage of ±10% the nomal supply voltage.
Test disc: SONY YEDS-7 Type-3 or ABEX TCD-781

Operation

Unit must work properly and correctly at the temperature range from 32° F (0° C) to 113° F (45° C) and the relative humidity from 40% to 80%, and with the supply voltage.

Storage

Temperature test: 48 hours each at -40° F (-40° C) and 149° F (65° C)
Humidity test: 95° F (40℃) 95% relative humidity.

Notes:

1. Nominal specs represent the design specs. All unit should be able to approximate these—some will exceed and some may drop slight below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable;in no case should a unit fail to meet limit specs.
2. This manual is based on the American standard, and provides information on regional circuit modification through the use of alternate schematic diagrams or wiring diagrams, and information on regional component variations through the use of parts lists. Design and specifications subject to change without notice.

CONTROL AND FUNCTIONS

DIS
Thi
firs
firs

RANDOM
This butto
automatic
on each C
random.

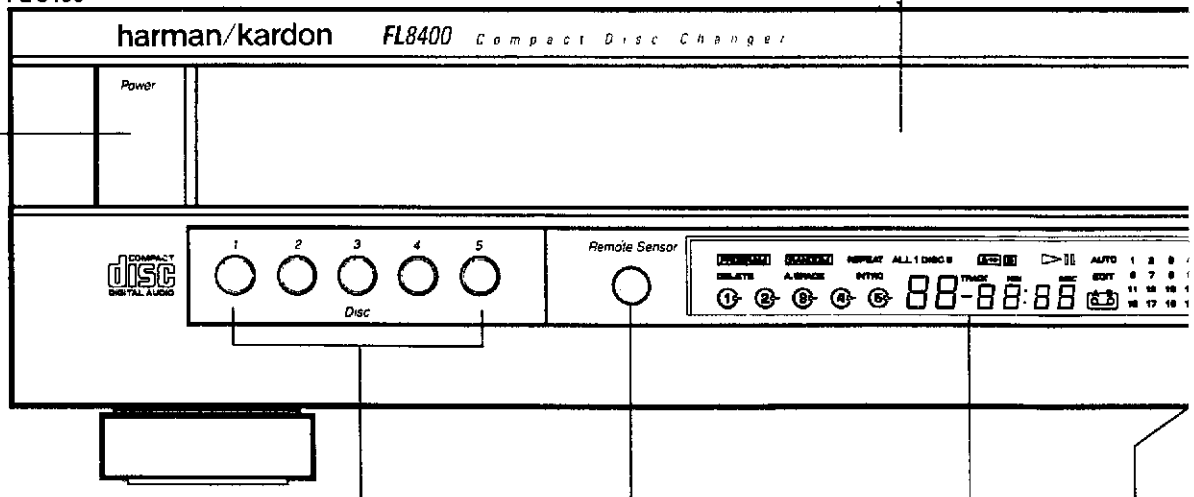
TIME BUTTON
This button is use
elapsed playing ti
beginning of the c
remaining playing
track or remaining
disc.

PROGRAM/REVIEW
This button is used for
your favorite tracks or c
reviewing the program
selections.

POWER SWITCH
Press the POWER switch to turn on this unit and press it again to turn it off.
For system operation, plug the AC input cord into the switched AC outlet, keep the power switch ON and control power ON/OFF with the main POWER switch on the amplifier or receiver.

DISC TRAYS (1-5)
One disc per tray can be loaded with the labelled side up.

FL-8400



MULTI FUNCTION DISPLAY
This display shows the corresponding information according to each mode.

DISC SELECTOR BUTTONS
These buttons are used for selecting the disc to be played.

INFRARED RECEIVER WINDOW
This receives the infrared signals transmitted by the commander and converts it into the electrical signal to control this unit.

BACKWARD SKIP
SEARCH BUTTON
This button is used f
the beginning of the
returning to a previo
searching for a parti
fast reverse.

DISC INTRO BUTTON
This button is used for playing the first 10 seconds of each track or the first track on CDs.

RANDOM PLAY BUTTON
This button is used to let the unit automatically select and play tracks on each CD or discs and tracks at random.

REPEAT BUTTON
This button is used for repeating one track, one disc or all discs.

DELETE BUTTON
This button is used for deleting the undesired tracks or discs.

TIME BUTTON
This button is used for checking the elapsed playing time from the beginning of the current track, remaining playing time of the current track or remaining playing time of the disc.

EDIT BUTTON
This button is used for editing the tracks to be recorded onto the cassette tape.

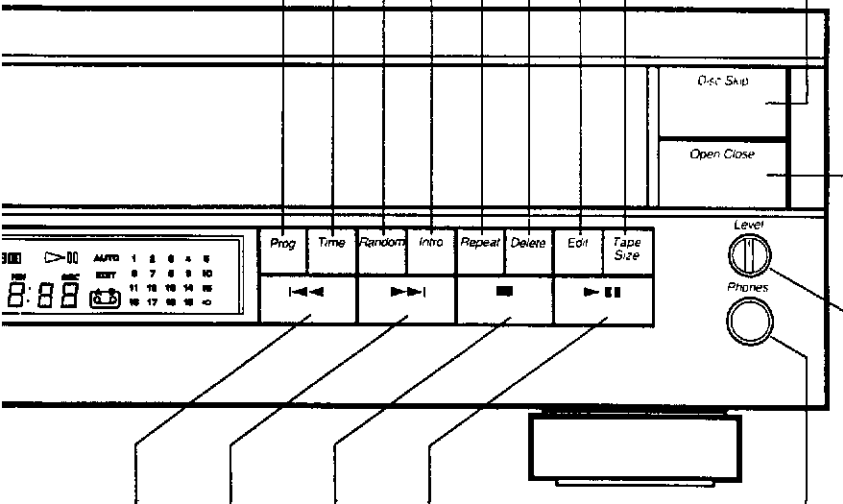
PROGRAM/REVIEW BUTTON
This button is used for programming your favorite tracks or discs or reviewing the programmed selections.

with

TAPE SIZE BUTTON
This button is used for selecting the tape length.

DISC SKIP BUTTON
Each time this button is pressed to load or unload the disc, the carousel will rotate to the next tray position clockwise.

OPEN/CLOSE BUTTON
This button is used for opening or closing the tray.



DISPLAY
corresponding to each mode.

PLAY/PAUSE BUTTON
This button is used for starting play, holding play at the beginning of a track or interrupting play.

HEADPHONE VOLUME
This is used for the adjustment of the headphone level.

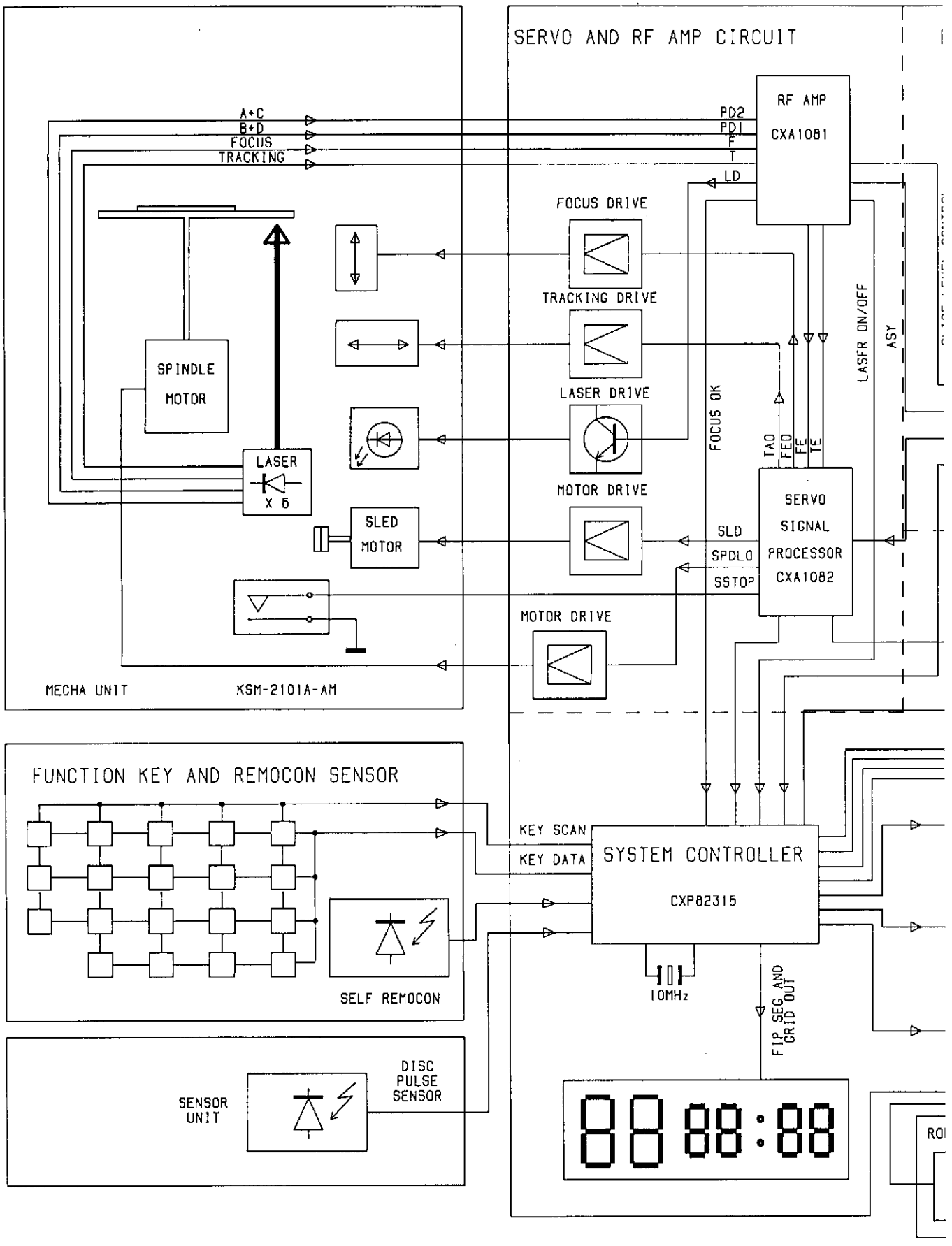
STOP/CLEAR BUTTON
This button is used for stopping play, clearing programmed selections or recovering the deleted selections.

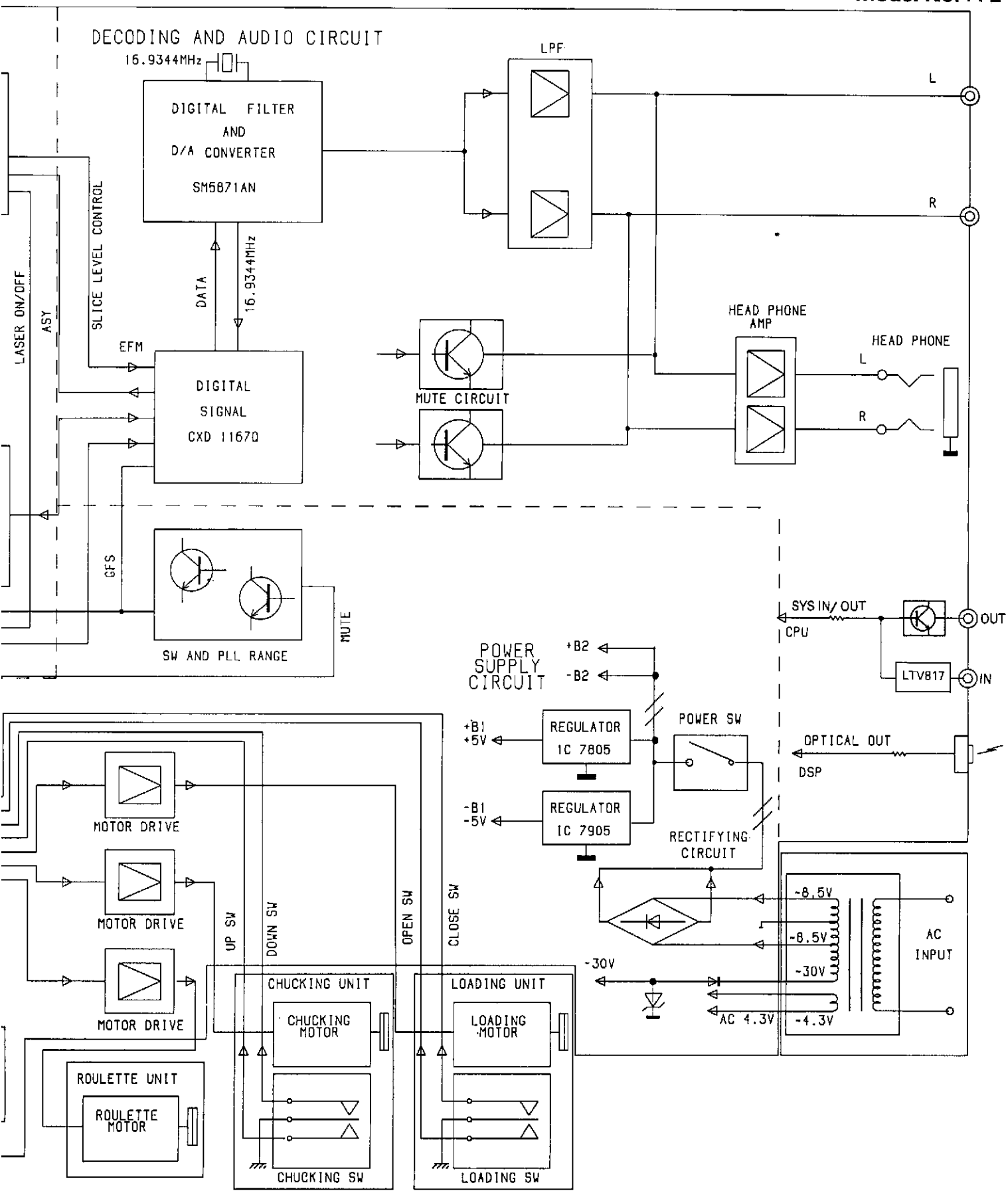
FORWARD SKIP/ SEARCH BUTTON
This button is used for moving on to a next track or searching for a particular passage in fast forward.

HEADPHONE JACK
This is used for listening with the headphones.

BACKWARD SKIP/ SEARCH BUTTON
This button is used for replaying from the beginning of the current track, returning to a previous track or searching for a particular passage in fast reverse.

BLOCK DIAGRAM




DECODING AND AUDIO CIRCUIT
16.9344MHz
DIGITAL FILTER AND D/A CONVERTER
SM5871AN
LPF
L
R
DATA
16.9344MHz
SLICE LEVEL CONTROL
LASER ON/OFF
ASY
EFM
DIGITAL SIGNAL CXD 1167Q
MUTE CIRCUIT
HEAD PHONE AMP
HEAD PHONE
L
R
GFS
MUTE
SW AND PLL RANGE
SYS IN/ OUT
CPU
OUT
LTV817
IN
POWER SUPPLY CIRCUIT
+B2
-B2
+B1
+5V
REGULATOR IC 7805
-B1
-5V
REGULATOR IC 7905
POWER SW
OPTICAL OUT
DSP
RECTIFYING CIRCUIT
~8.5V
~8.5V
~30V
~30V
AC 4.3V
-4.3V
AC INPUT
MOTOR DRIVE
MOTOR DRIVE
MOTOR DRIVE
UP SW
DOWN SW
OPEN SW
CLOSE SW
CHUCKING UNIT
CHUCKING MOTOR
LOADING UNIT
LOADING MOTOR
ROULETTE UNIT
ROULETTE MOTOR
CHUCKING SW
LOADING SW

DISASSEMBLY INSTRUCTIONS

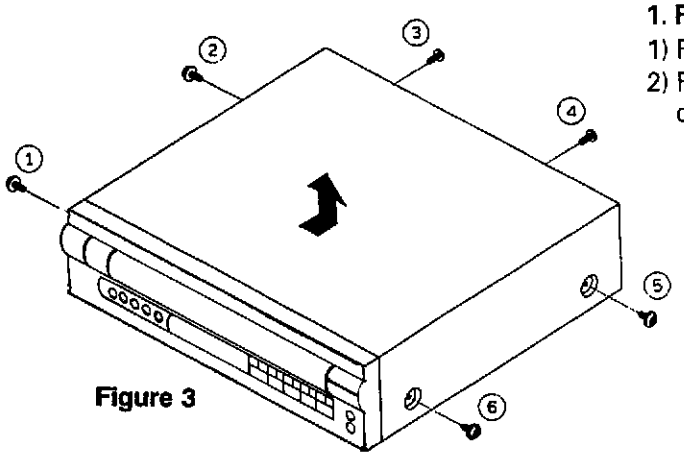


Figure 3

1. Remove the top cover (Figure 3).

1) Remove 6 screws (① to ⑥) holding the top cover.
2) Remove 1 screw and then lug wire from the bottom chassis.

2. Remove the bottom cover (Figure 4).

1) Turn the set over.
2) Remove 9 screws (① to ⑨) from the bottom chassis.
3) Remove 2 screws (⑩, ⑪) from the back chassis.

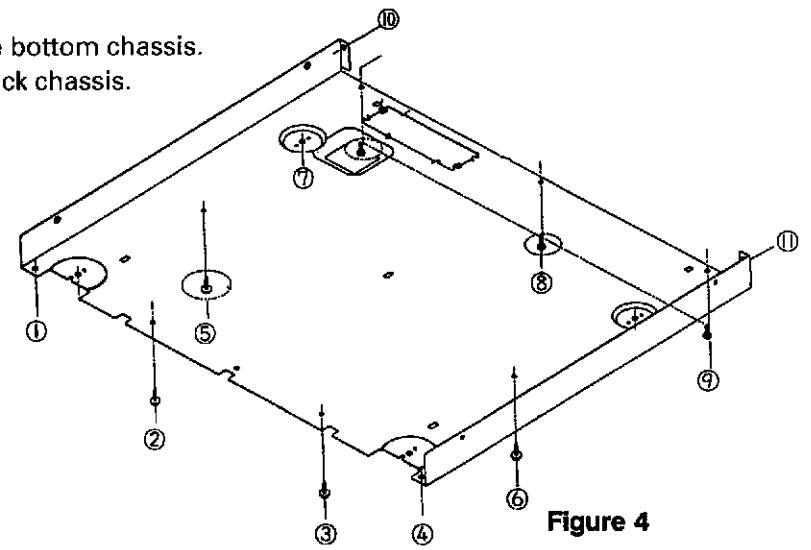


Figure 4

3. Remove the front panel (Figure 5).

1) Remove 3 screws (① to ③).
2) Remove 2 connectors (CNT105, CNT109) from the main B'D.
3) Remove 3 screws (④ to ⑥).
4) Turn to the clockwise gear loading of the assembly lock gear (see figure 6).
5) Hold the cover tray and then pull it up.
6) Remove 2 connectors (CNT111, CNT112) from the main B'D.

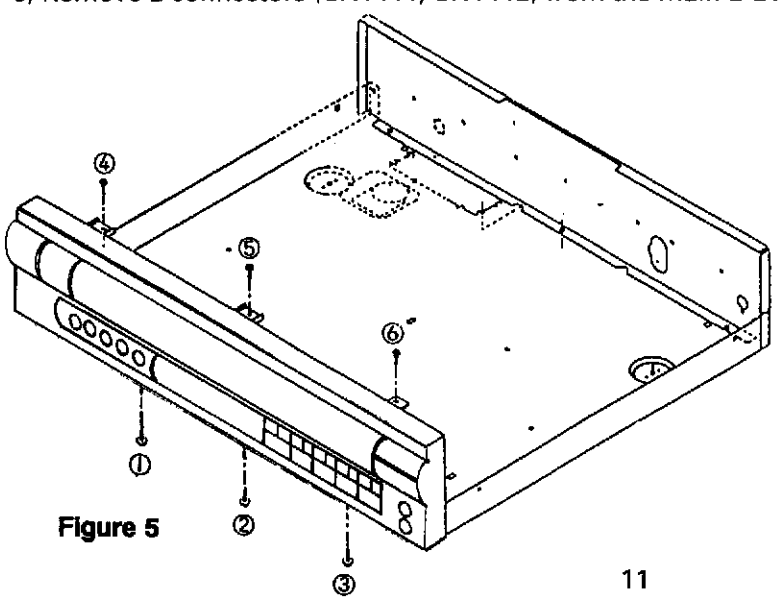
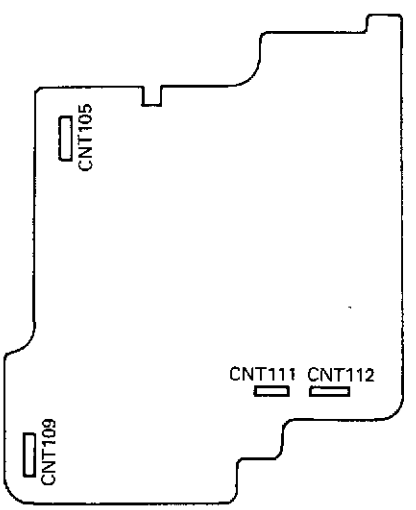


Figure 5



4. Remove the loading table (Figure 6).

1) Remove 4 screws (① to ④) holding the frame body.
2) Remove 4 screws (⑤ to ⑧) holding the assembly chuck.
3) Remove the assembly chuck.
4) Stretch out the frame body and then remove.
5) Remove 2 screws ⑨ and ⑩ holding the left guide tray (F) (same as right guide tray).
6) Pull the roulette tray up to the front and hold it up.
7) Remove the lead assembly 4P from CNT107-A on the sensor B'D.

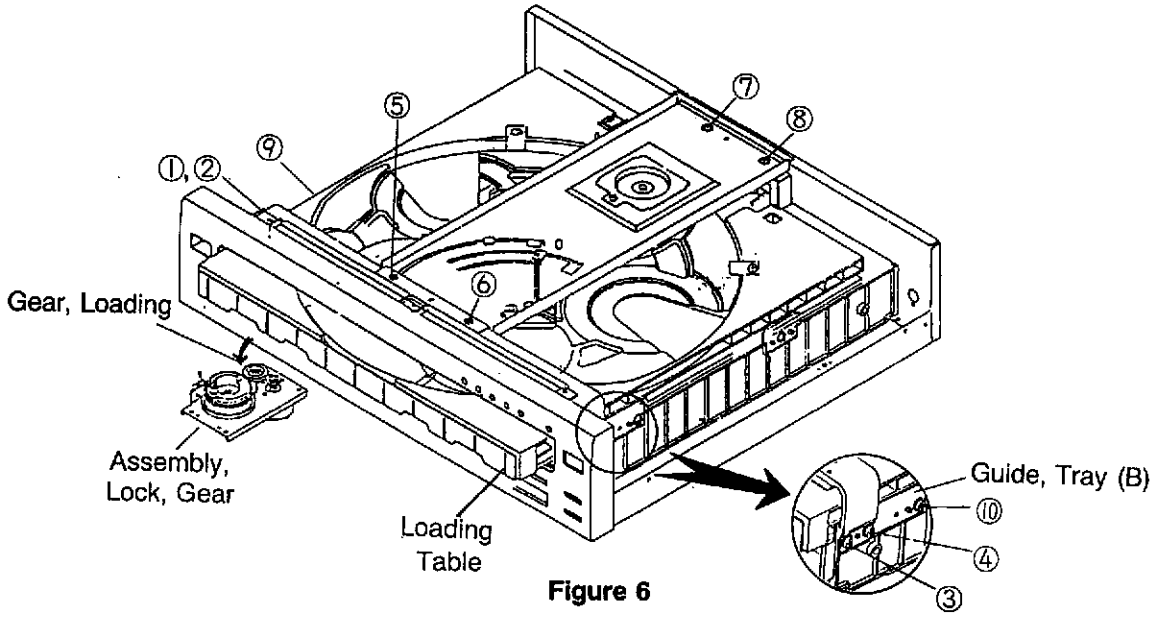


Figure 6

5. Remove the main board (Figure 7).

1) Disconnect all lead assembly.
2) Release the 4 tabs (attached to the main board) from the body mechanism.

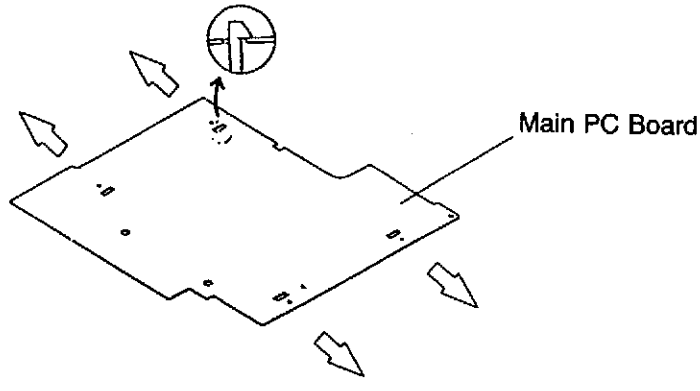


Figure 7

PICKUP REPLACEMENT

Caution:
Laser diodes are extremely susceptible to damage from static electricity. Even if a static discharge doesn't not ruin the diode, it can shorten its life or cause it to work improperly. When replacing the pickup, take appropriate measures, such as using a conductive mat and a grounded soldering iron, to protect the laser diode from static damage.

1. Remove the CD mechanism assembly by refering to the "exploded view" (See Figure 8).

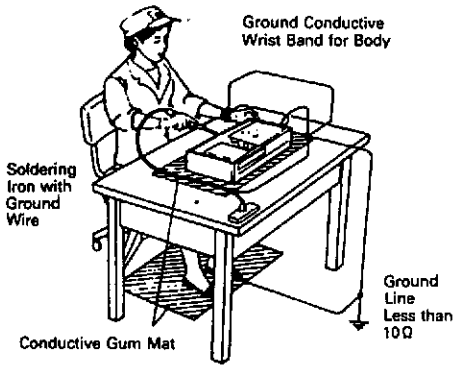


Figure 8

2. Remove four screws S12 (See Figure 9).

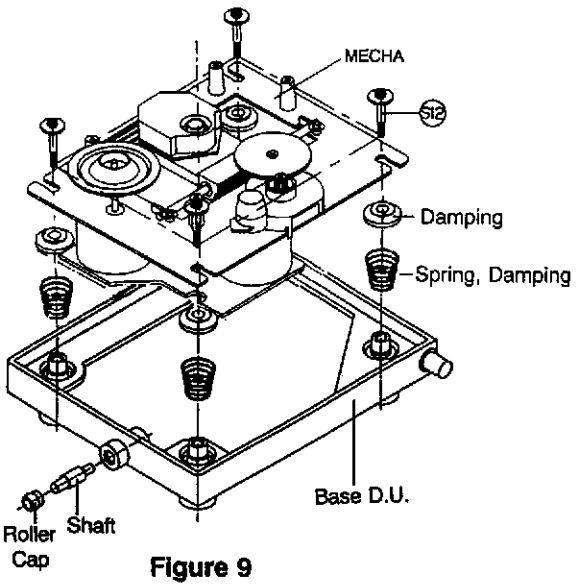


Figure 9

3. Remove the gear A (See Figure 10).
4. Pull out the slide shaft.

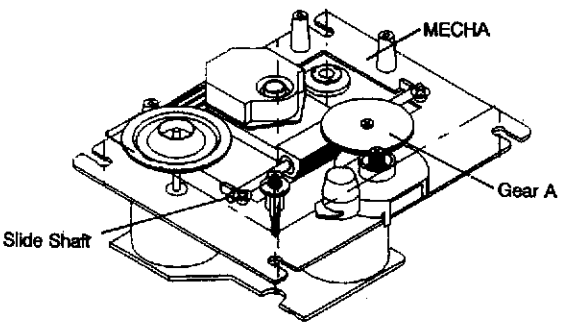


Figure 10

5. Remove the pickup (See Figure 11).

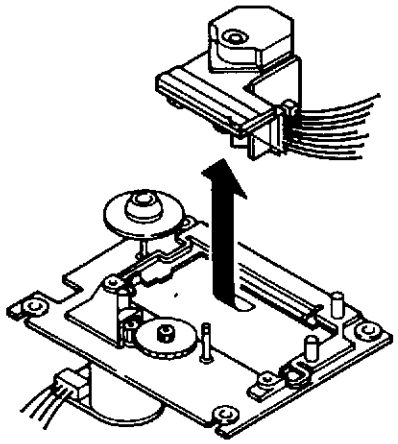


Figure 11

6. After you connect the wire connector, desolder and remove the shorting tab (See Figure 12).

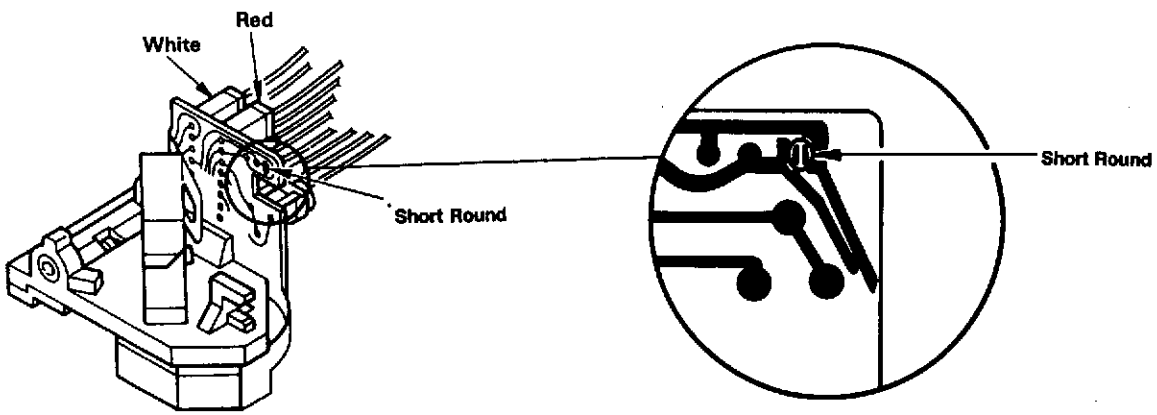


Figure 12

7. Refer to the exploded view of the compact disc mechanism on page 39 for detailed illustrations.

OPERATION CHECK

When the power switch is turned on after the chucking arm is removed, observe the objective lens and check the following. (The optical system block should be at the lead-in position when it is checked.)

1. The disc table should be at the innermost position after the chucking arm is removed.
2. The diffused light of the laser beam can be seen when the power switch is turned on.
3. Vertical (up and down) movement of the objective lens take place (2 or 3 times).

CIRCUIT DESCRIPTION

1. APC CIRCUIT

A semiconductor laser is used as the light source for the optical pickup. As the laser diode has large negative temperature characteristics in its optical output when driven with a constant current, a circuit must be provided to stabilize this output. For this purpose, a monitor diode which detects the optical output of the laser diode is used in the semiconductor laser.
As the laser diode emits light from its bonded surface, light is emitted both in front and behind. The light emitted behind is monitored with the monitor diode installed on its rear surface, and the optical output is thus controlled. The light emitted in front becomes the light source for the pickup.

Fig. 1 Shows the APC circuit.
When the temperature rises and the optical output decreases, the monitor diode current (IS) decreases, the electric potential of IC104 pin 5 rises, the base current of the driving transistor increases, and the laser diode current increases. This causes the reduced optical output to return to its former level.

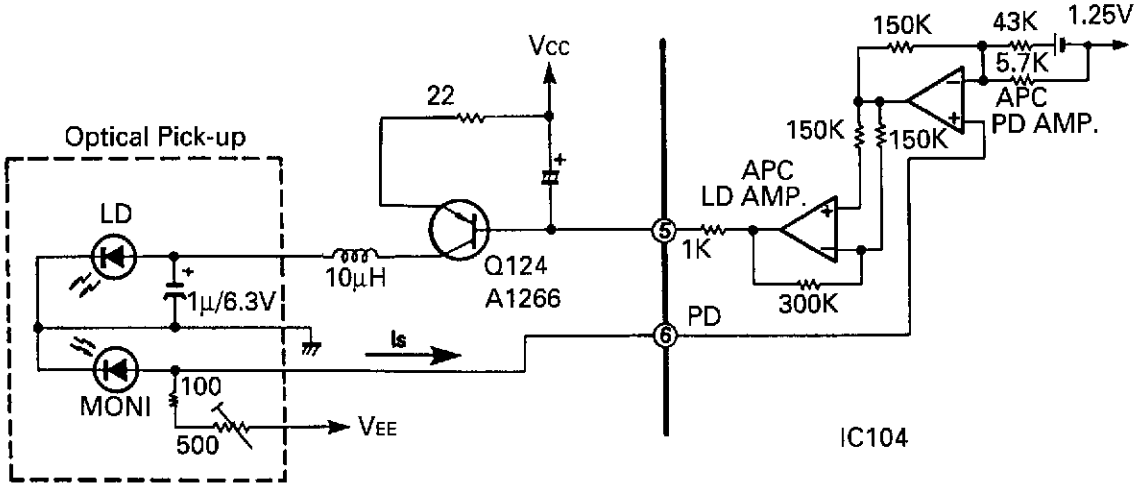
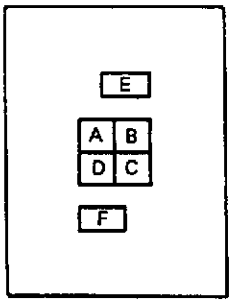


Fig. 1

2. FOCUS SERVO

2-1. Optical pickup

This set employs a three-beam optical pickup comprised of six division photodiodes, A through F as shown in Fig. 2. The four photodiodes (A through D) at the center provide focus error detection by using their property to allow the beam to focus into a round image only at a certain point.
The sums of outputs from diagonal two elements of four division photodioddes (A+C and B+D) are compared by the differential amplifier in IC104 to detect the shape of the beam image.
The remaining two diodes (E and F) provide tracking error detection by means of sub-beam spots.



Three spotted (six-division) photo diodes

Fig. 2

2-2. Focus error detecting operation

The reflected laser beam from a disc is polarized 90° with the beam-splitter and sent to the cylindrical lens. The beam passed through this cylindrical lens is then sent to the four division photodiodes and focuses into an image whose shape varies with the distance between the disc and the objective lens. Such change in the beam shape causes the current flowing from the photodiodes to vary.

Shown in Fig. 3 is the principle of the focus error detection.
The currents from the photodiodes (A+C and B+D) are applied to pins 7 and 8 of IC104 and converted to voltage by RF I-V amplifiers (1) and (2) included in IC104.

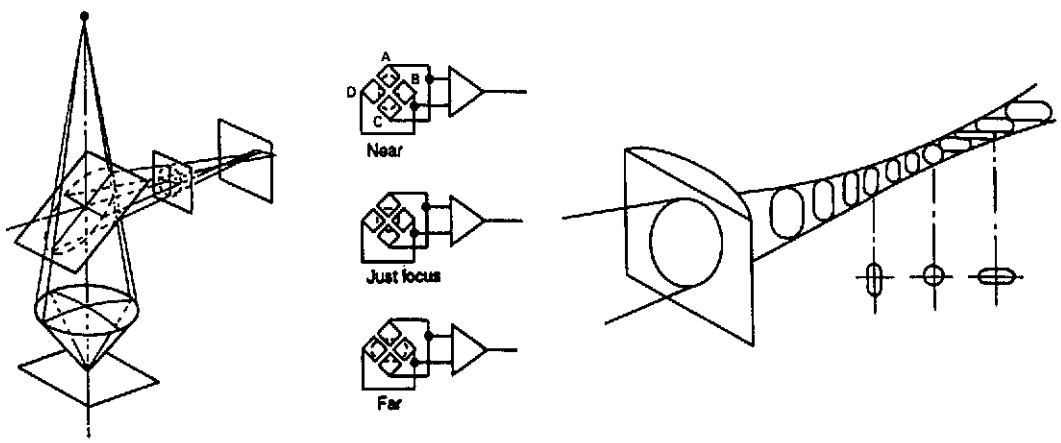


Fig. 3

2-3. Focus servo control operation

The focus error signal, after being converted to voltage by the RF I-V amplifier, is transmitted to the operation amplifier in the IC and output from pin 19.
When the disc to objective lens distance is in focus, the beam forms a true round. In this state, the beams applied to four elements of four division photodiodes become equal and thus the output provided then is 0(zero). When the disc to objective lens distance is too close (near focus), the beam is reflected divergently to form an oval in crosswise direction. In this state, the outputs provided from photodiodes A and C are higher than those from B and D, resulting in negative (–) output voltage. On the other hand, when the distance is too far (far focus), the beam is reflectd convergently to form an oval in longitudinal direction. Then the outputs from photodiodes B and D are higher, resulting in positive (+) output.
The output voltage (focus error signal) from pin 19 of IC104 passes through IC103, in from pin 6 and out from pin11, as shown in Fig. 4. It is amplified in IC103 and fed to the focus coil which then drives the objective lens of the pickup.

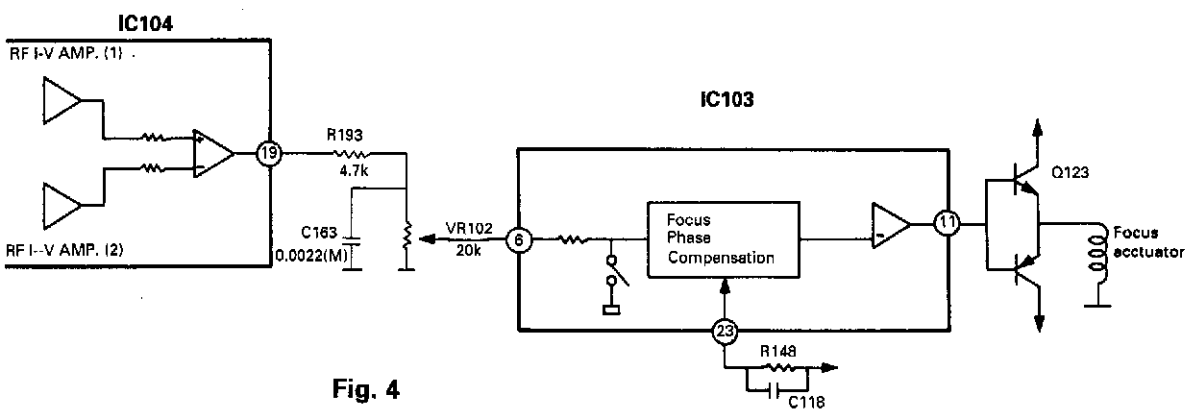


Fig. 4

2-4. Tracking error detection system

Fig. 5 Shows the principle of the tracking error detection system which employs the three beam system. The laser beam is divided into the main beam and two sub-beams by diffraction grating and they are arranged on one line. The center line connecting these three beams has a slight offset angle against the main beam. The main beam is received by photodiodes A, B, C and D and two sub-beams by E and F respectively.

Flg. 5-A shows the on-track state. As both auxiliary beams 1 and 2 are slightly on the track in this state, the outputs of photodiodes E and F are equal and the tracking signal is 0(zero). When the track is shifted to the left (Fig. 5-B), the auxiliary beam 1 is off the pit. This allows more light to be received by the photodiode E, resulting in positive (+) tracking signal output. On the other hand, when the track is shifted to the right (Fig. 5-C), the amount of light received by the photodiode F increases, resulting in negative (-) tracking signal output. And these extreme signals are detected as tracking error signals.

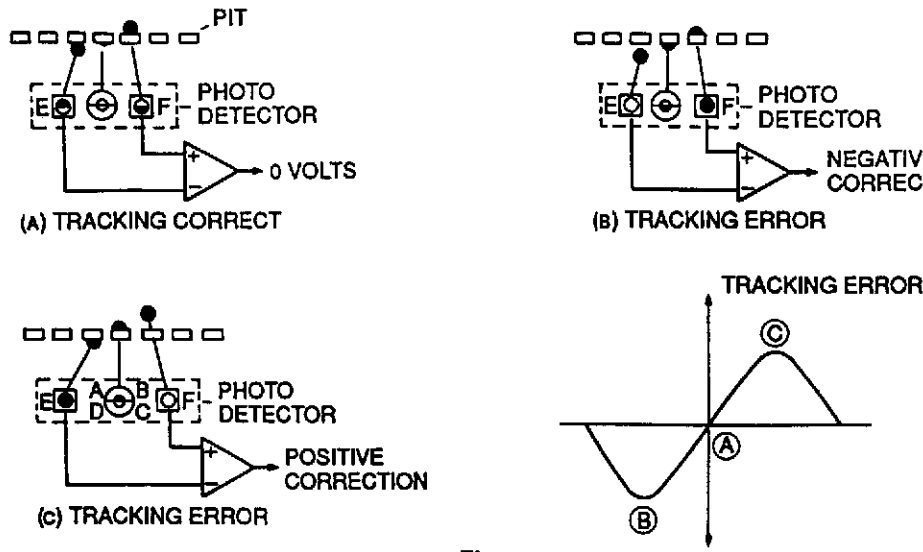


Fig. 5

2-5. Tracking servo control operation

When a tracking error signal is detected by photodiodes E and F, it is fed to pins 17 and 10 of IC104 respectively as shown in Fig. 6. In IC104, the signal is converted into voltage by the E I-V amplifier and F I-V amplifier, transmitted to the tracking error amplifier and output through pin 20. While it passes through IC103, in from pin 3 and out from pin 17, it is amplified in IC103 and sent to the tracking coil to adjust pickup so that the amount of track shift is reduced as closely to none as possible.

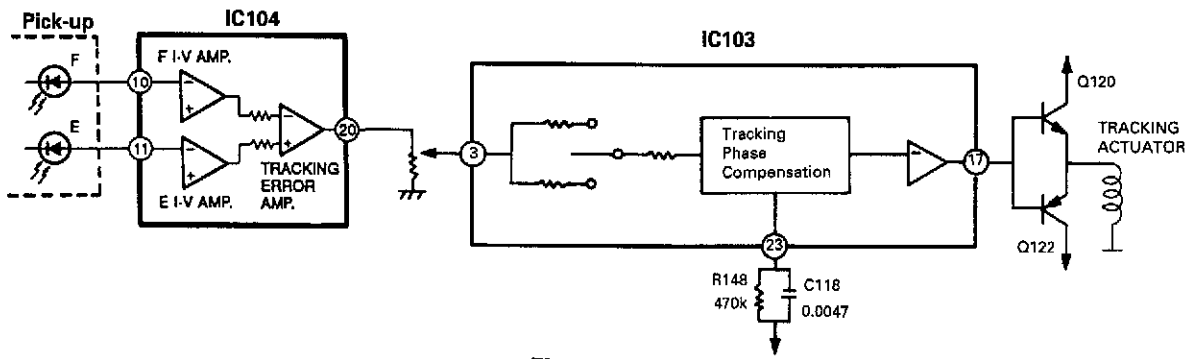


Fig. 6

3. Regenerative Circuit

3-1. RF circuit

The currents from photodiodes (A, B, C and d) are fed to IC104 through pins 7 and 8 and converted to voltage by RF I-V amplifiers (1) and (2) respectively there, added by the RF summing amplifier and output from pin 2 as a signal. It can be checked at the test point (RF T.P.) provided on its way by means of the eye pattern check.

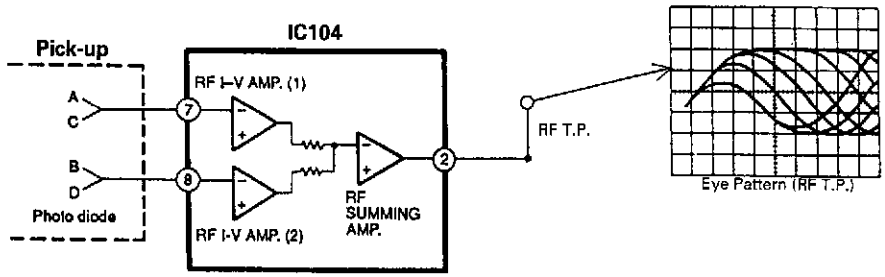


Fig. 7

3-2. EFM demodulation, error correection, serial/parallel conversion

The EFM comparator changes RF signal into a binary value. As the asymmetry generated due to variations in disc manufacturing cannot be eliminated by the AC coupling along, the reference voltage of EFM comparator is controlled utilizing the fact that the generation probability of 1, 0 is 50% each in the binary EFM signals.

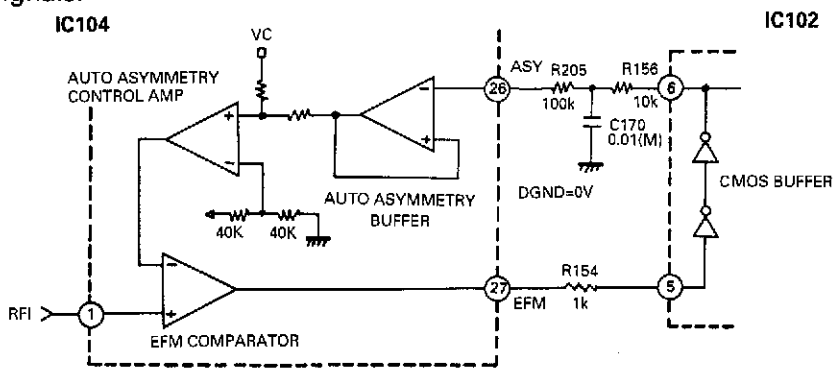


Fig. 8

As this comparator is a current SW type, each of the H and L levels does not equal the power supply voltage, requiring feedback through a CMOS buffer.
R8, R9, C8, and C9 form a LPF to obtain (Vcc+DGND)/2V, When fc (cut-off frequency) is made more than 500 Hz the EFM low-frequency component leaks badly, degenerating the block error rate.

3-3. Digital Signal Processor

The EFM signals from pin 27 of IC104 are sent to pin 5 of IC102, then demodulated from 14 bits to 8 bits by EFM readjustment. At the same time any error, if found, is corrected (CIRC) and the signals are sent to the D/A converter interface. After that they are output as 16-bit digital signals from pins 76, 78 and 80 of IC102 and fed to the D/A Converter of IC107. In this case, EFM demodulation, error correction and serial/parallelconversion are performed by the internal circuitny of IC102.

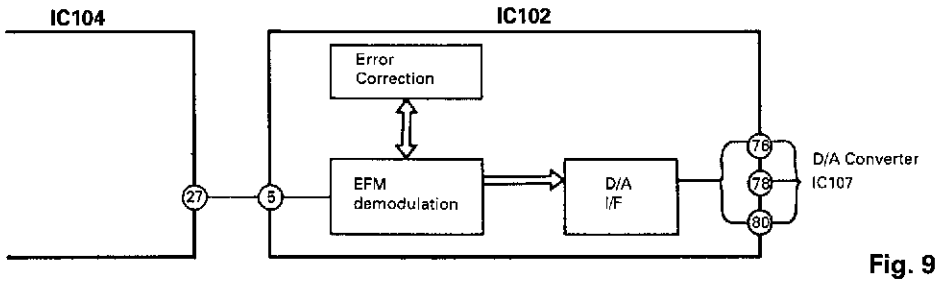


Fig. 9

4. 1-bit D/A Converter

Fig. 10 Shows the configuration of the SM5871.

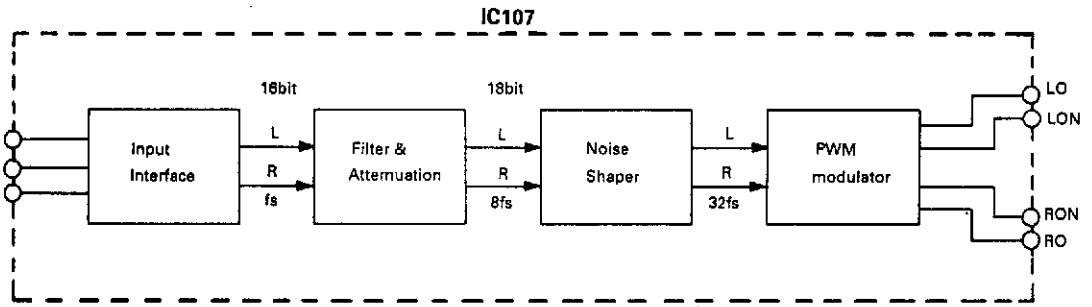


Fig. 10

The sampling frequency of the input data is expressed in fs, so the 3rd order noise shaping circuit operates at 32fs. This means that a 32-times oversampling filter is vequired.
In this LSI, oversampling is carried out the multiple stage. Fig. 11 shows the configuration of filter, attenuation, and noise shaper.

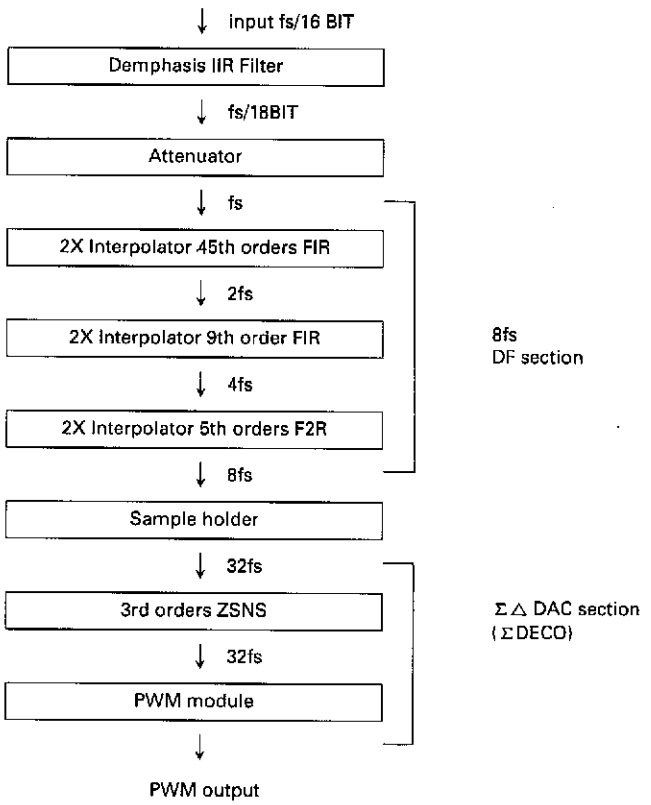


Fig. 11

5. Audio Circuit.

Fig. 12 Shows a schematic diagram of the audio circuit.

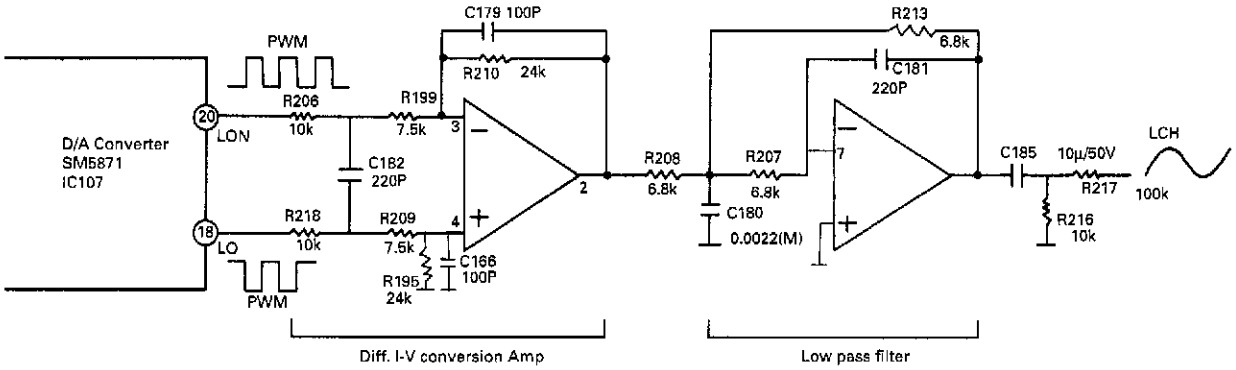


Fig. 12

The output from pin 18(LO) and pin20(LON) of the IC107 D/A Converter SM5871 is input to the diffevential I-V conversion amplifier. The output fed to the stage of low pass filter.

ALIGNMENT AND ADJUSTMENT

TEST POINT LOCATION

EQUIPMENT REQUIRED:

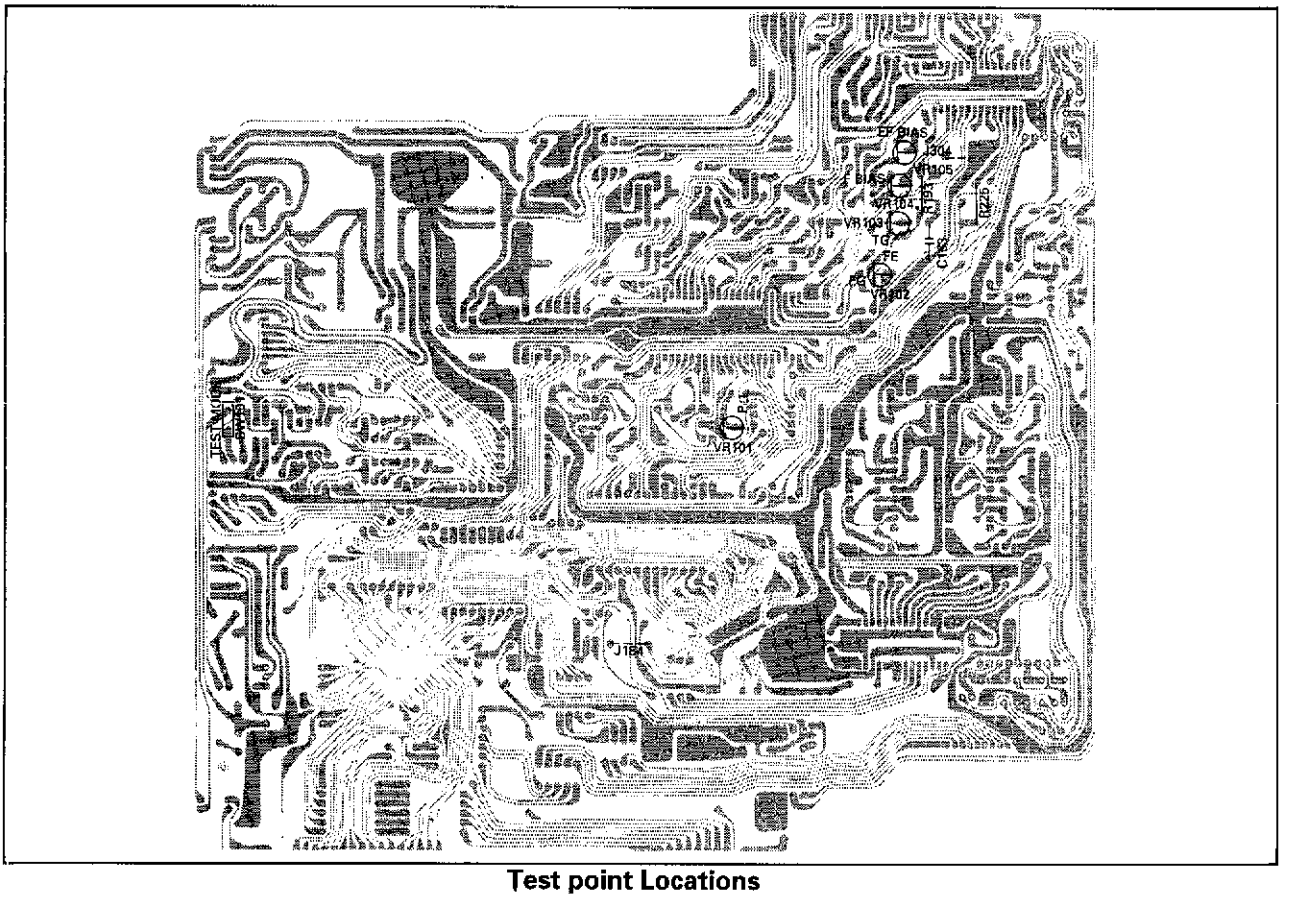
- Oscilloscope over 50 MHz
- Frequency counter
- Test disc PHILIPS 5A
- A regular compact disc
- SONY YEDS-7 Type 3 or ABEX TCD 781

BEFORE ADJUSTMENTS:

- Make adjustments in numerical order.
- Use the dualtrace oscilloscope with high impedance (greater than 10 Mohm).
- How to enter into the test mode:
  1) Open the disc tray.
  2) Turn off power.
  3) Turn on power while pressing "SW101 (TEST MODE)".
  4) "0" or all segments appear in the display indicates the test mode
  5) If you press PLAY, the test mode change to TEST MODE 1.
  6) If you press PLAY, again the test mode change to TEST MODE 2.
  7) If you press PLAY, again the test mode change to TEST MODE 3.
- Initial semi-fixed VR setting.

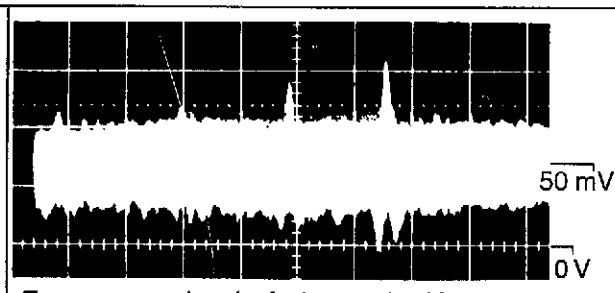
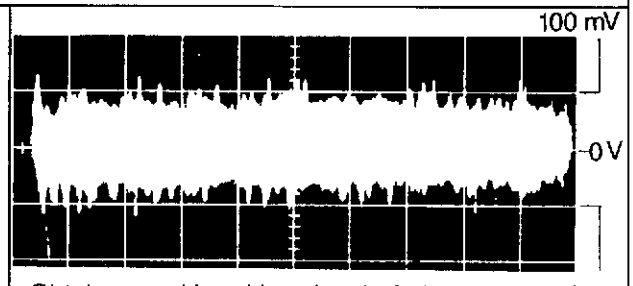
  Set the semi-fixed resistance tentatively as follows:

VR101 (PLL)	Center position
VR102 (F. Gain)	Turn fully counterclockwise
VR103 (T. Gain)	Turn fully clockwise
VR104 (F. Bias)	Center position
VR105 (EF Balance)	Center position



Test point Locations

CIRCUIT ADJUSTMENT

Step	Connect	Setting	Adjust	Remarks
Focus Gain Adjustment				
1	See figure 13	In TEST MODE 2	VR102	 Focus error signal of about 50 mV.
2	To increase the focus gain, turn VR102 clockwise.			
Tracking Gain Adjustment				
1	See figure 14	In TEST MODE 2	VR103	 Obtain a tracking drive signal of about 200 mV.
2	Place PHILIPS test disc 5A in the tray and play section with the 800μm black dot, Confirm there is no skipping.			
3	If there is any skipping, adjust VR103 to reduce the tracking servo gain untill no skipping occurs. To reduce the gain, turn VR103 rclockwise.			

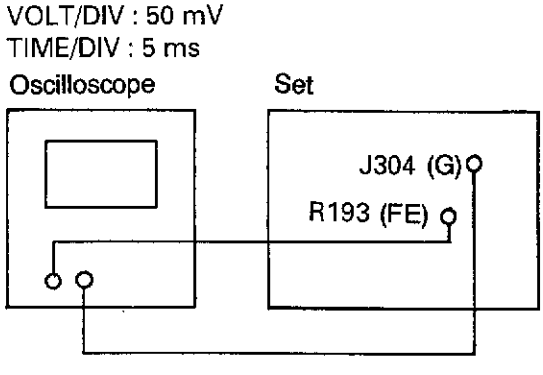


Figure 13. Focus Gain Adjustment

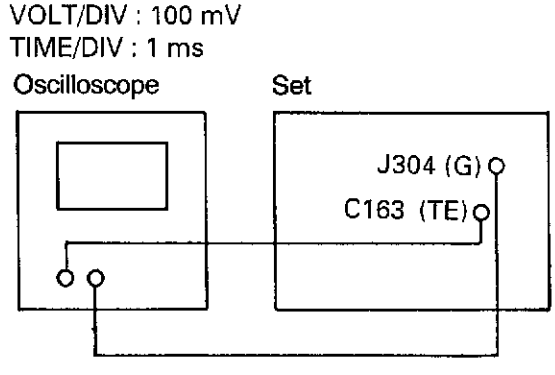
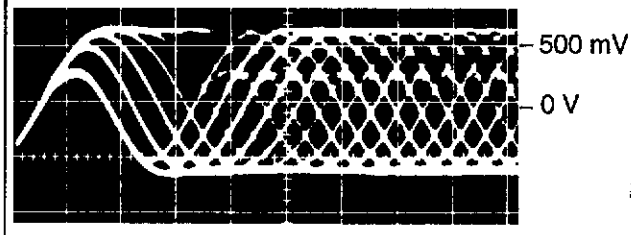


Figure 14. Tracking Gain Adjustment

Step	Connect	Setting	Adjust	Remarks
Focus Offset Adjustment				
1	See figure 15	In TEST MODE 2	VR104	Obtain the maximum amplitude and the biggest diamond windows of the eye pattern.  The above an example of a good eye pattern.
2	To make the diamond windows in the portion large and clear, turn VR104 clockwise.			

Coupling : AC
VOLT/DIV : 500 mV
TIME/DIV : 0.2 μS

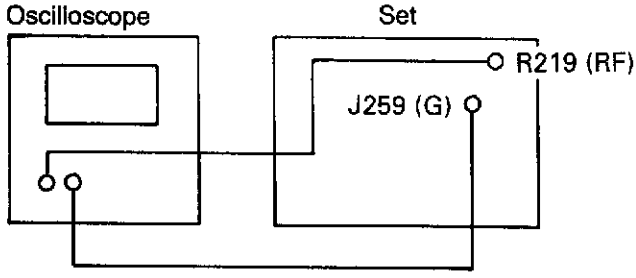
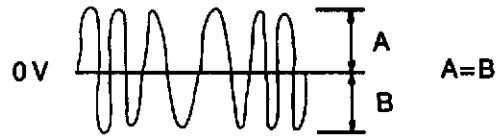


Figure 15. Focus Offset Adjustment

Step	Connect	Setting	Adjust	Remarks
	PLL (Phase Locked Loop) Adjustment.			
1	See figure 16	In TEST MODE 0	VR101	Counter reading should be 4.3218 MHz
2	Disconnect between J304 (GND) and R225 (ASY).			
3	Check the counter reading to be 4.3218 ±0.0025 MHz in TEST MODE 0.			
	EF Balance Adjustment			
1	See figure 17	In TEST MODE 1		 VOLT/DIV: 1 V TIME/DIV: 1 ms
2		Turn a disc gently with your finger and adjust VR105 to obtain a symmetrical waveform.	VR105	Obtain a symmetrical waveform.
3	The above adjustments must be made very carefully, as misadjustment may cause skipping.			

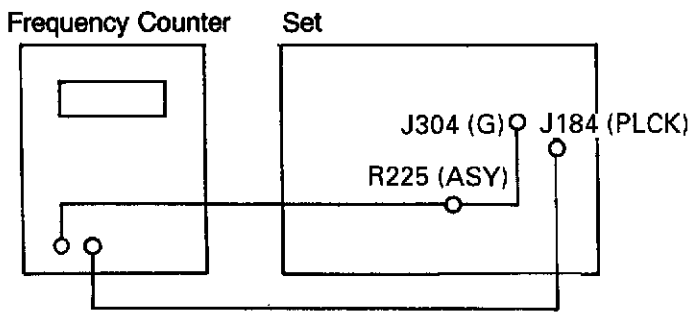


Figure 16. PLL Adjustment

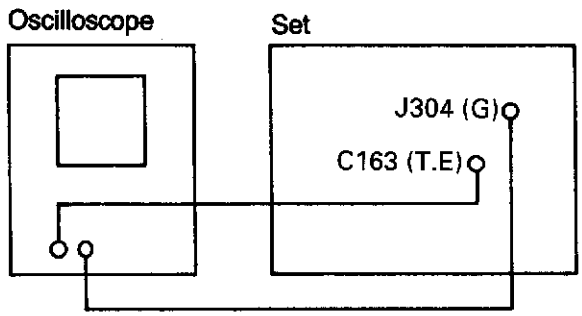
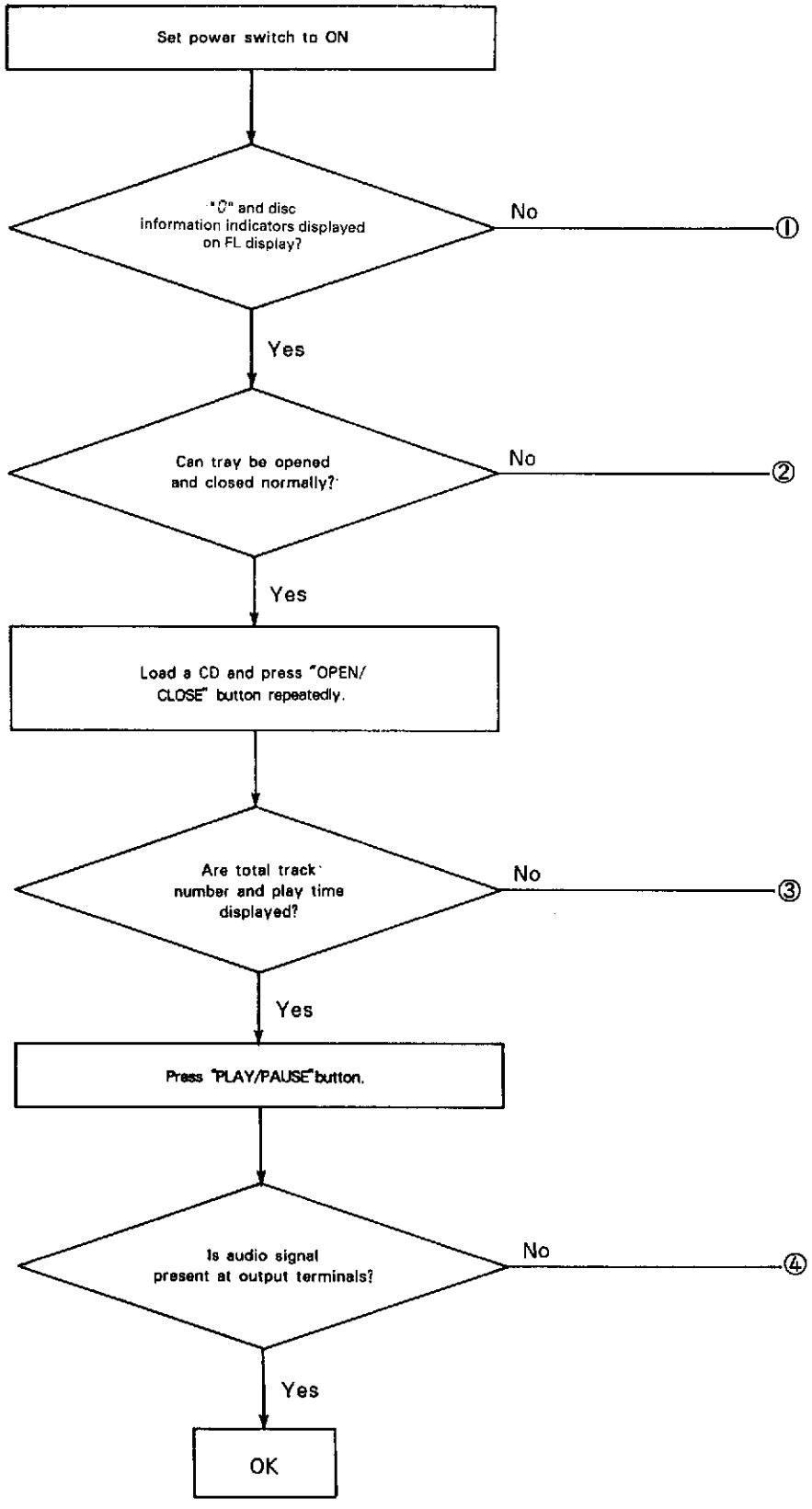


Figure 17. EF Balance Adjustment

TROUBLESHOOTING



At power on. "0" and some parts are not displayed.

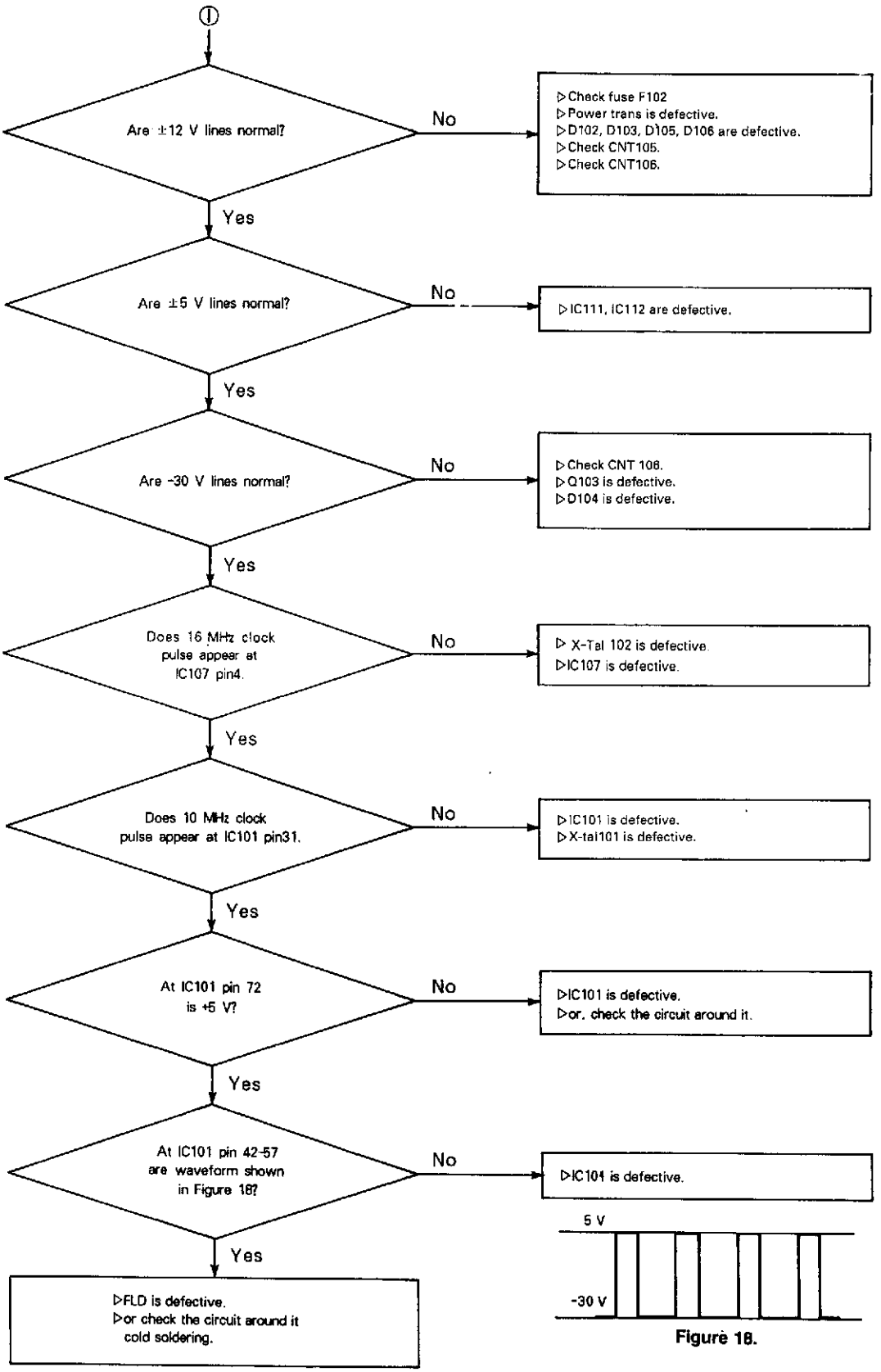
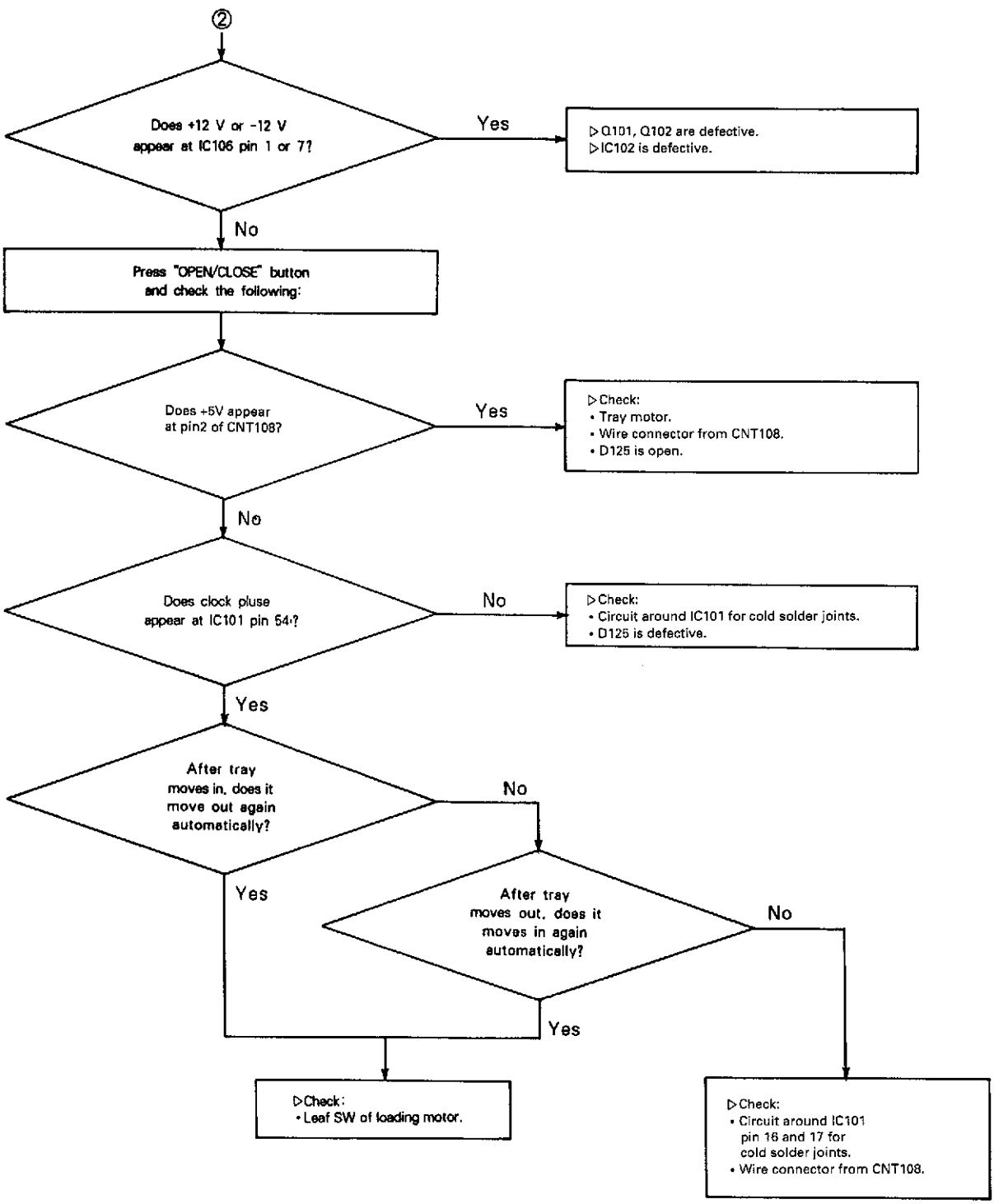
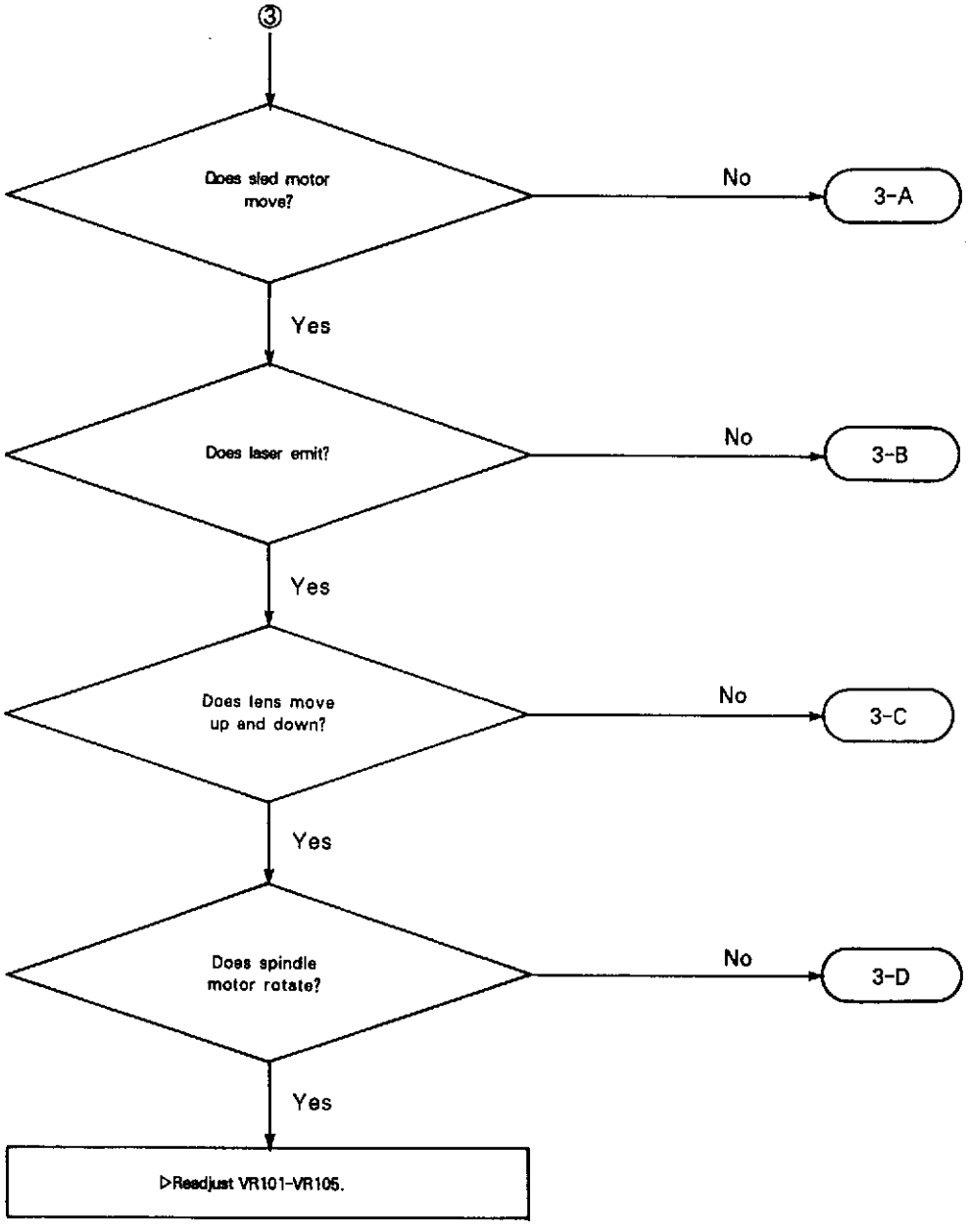


Figure 18.

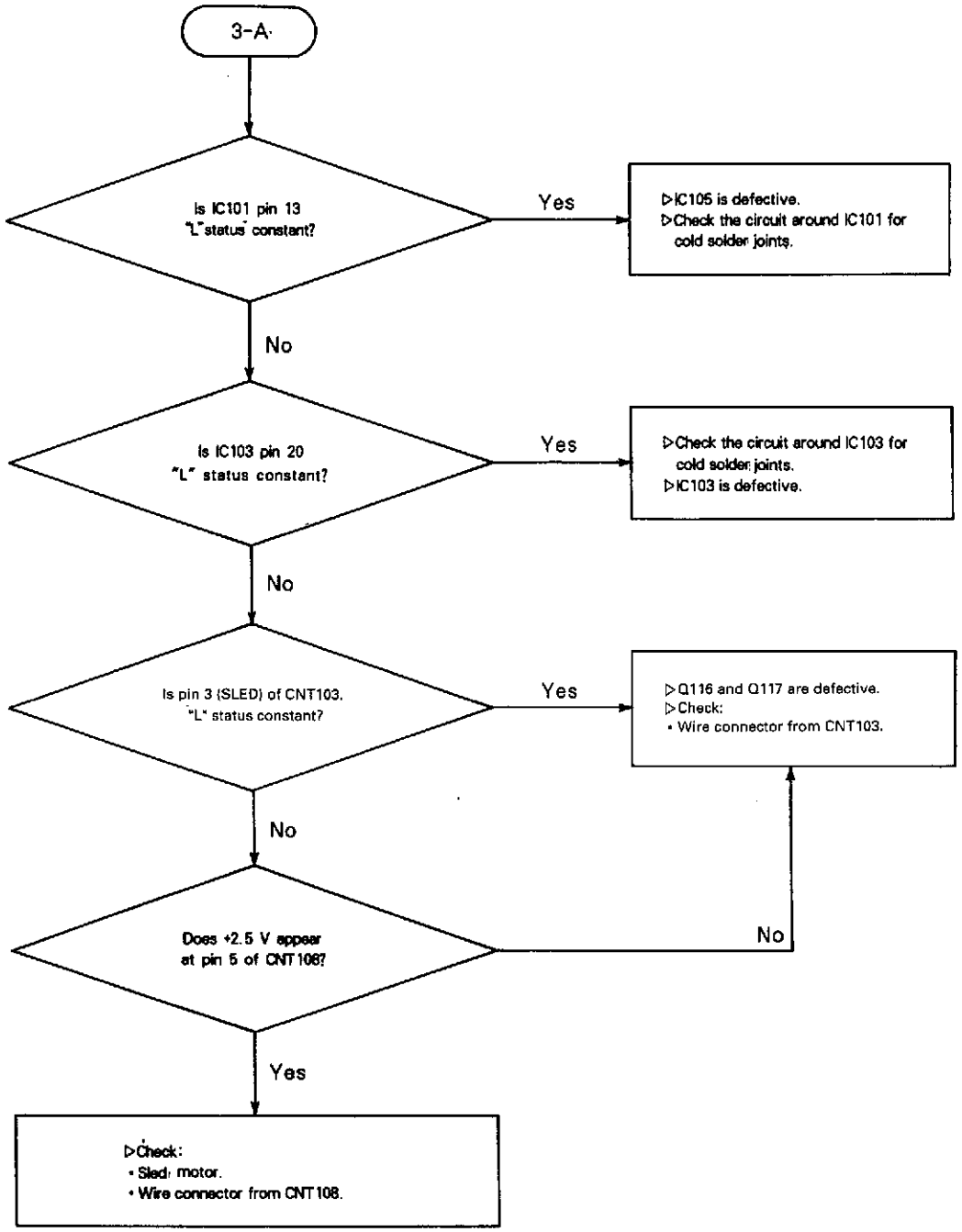
Tray cannot be opened and closed by pressing "OPEN/CLOSE" button.


②
Does +12 V or -12 V appear at IC106 pin 1 or 7?
Yes
▷Q101, Q102 are defective.
▷IC102 is defective.
No
Press "OPEN/CLOSE" button and check the following:
Does +5V appear at pin2 of CNT108?
Yes
▷Check:
• Tray motor.
• Wire connector from CNT108.
• D125 is open.
No
Does clock pluse appear at IC101 pin 54?
No
▷Check:
• Circuit around IC101 for cold solder joints.
• D125 is defective.
Yes
After tray moves in, does it move out again automatically?
No
Yes
After tray moves out, does it moves in again automatically?
No
Yes
▷Check:
• Leaf SW of loading motor.
▷Check:
• Circuit around IC101 pin 16 and 17 for cold solder joints.
• Wire connector from CNT108.

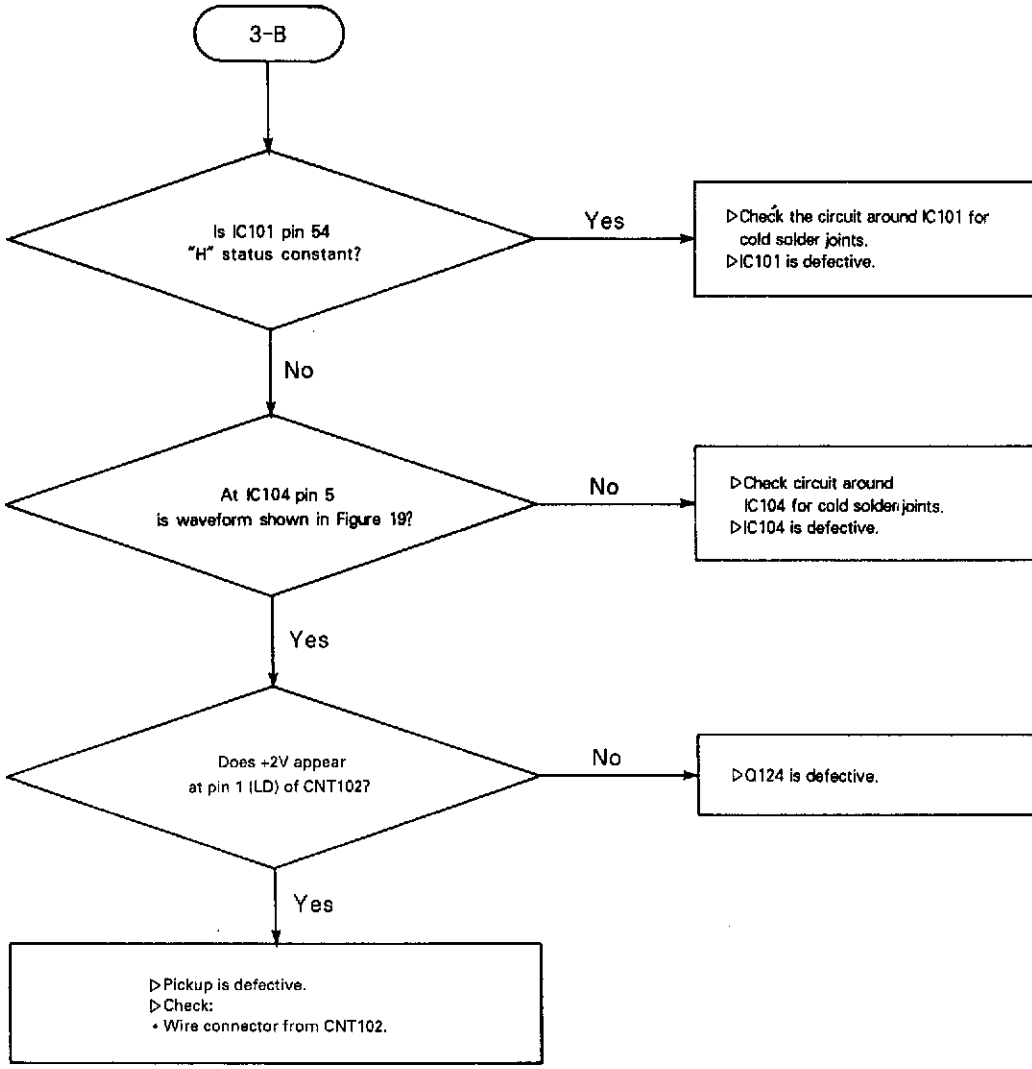
"0" is displayed instead of total track number and play time.



Sled motor does not move.



Laser does not emit.



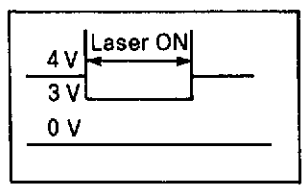


Figure 19

Object lens of pickup unit does not move up and down.

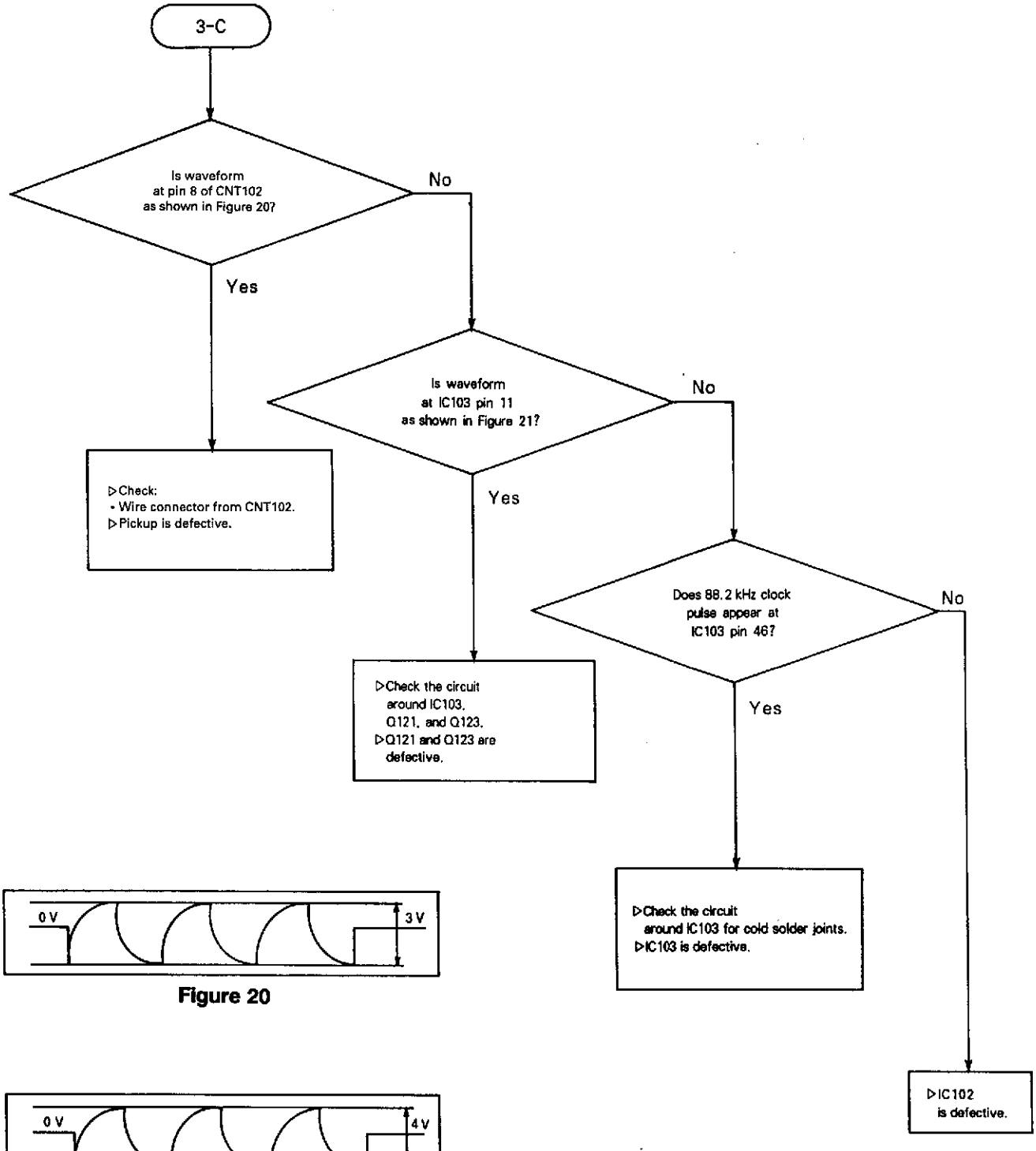

3-C
Is waveform at pin 8 of CNT102 as shown in Figure 20?
No
Yes
Is waveform at IC103 pin 11 as shown in Figure 21?
No
Yes
▷Check:
• Wire connector from CNT102.
▷Pickup is defective.
▷Check the circuit around IC103, Q121, and Q123.
▷Q121 and Q123 are defective.
Does 88.2 kHz clock pulse appear at IC103 pin 46?
No
Yes
▷Check the circuit around IC103 for cold solder joints.
▷IC103 is defective.
▷IC102 is defective.

Figure 20

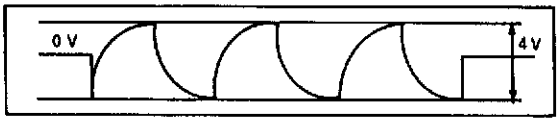
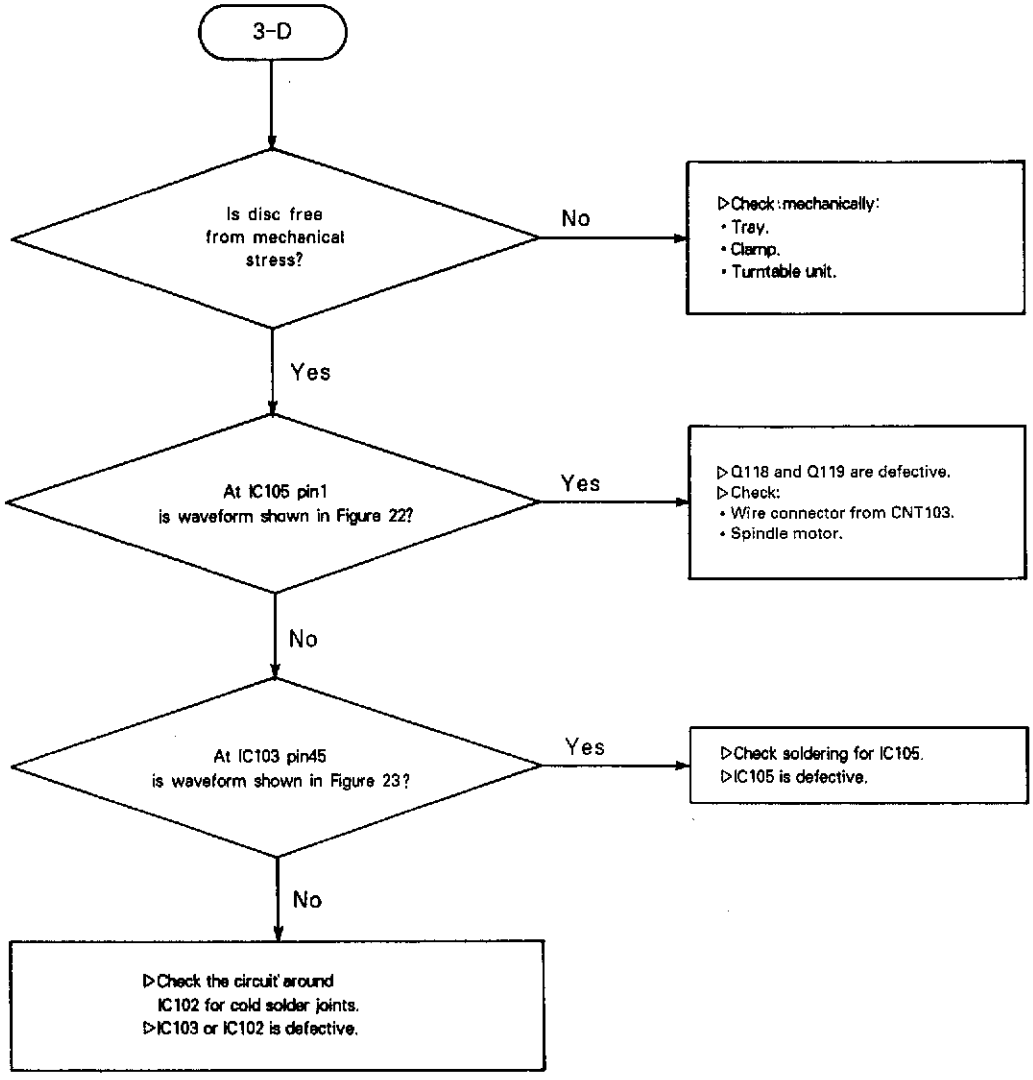


Figure 21

Spindle motor does not rotate.



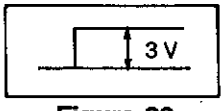


Figure 22

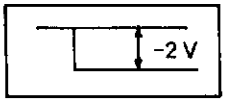
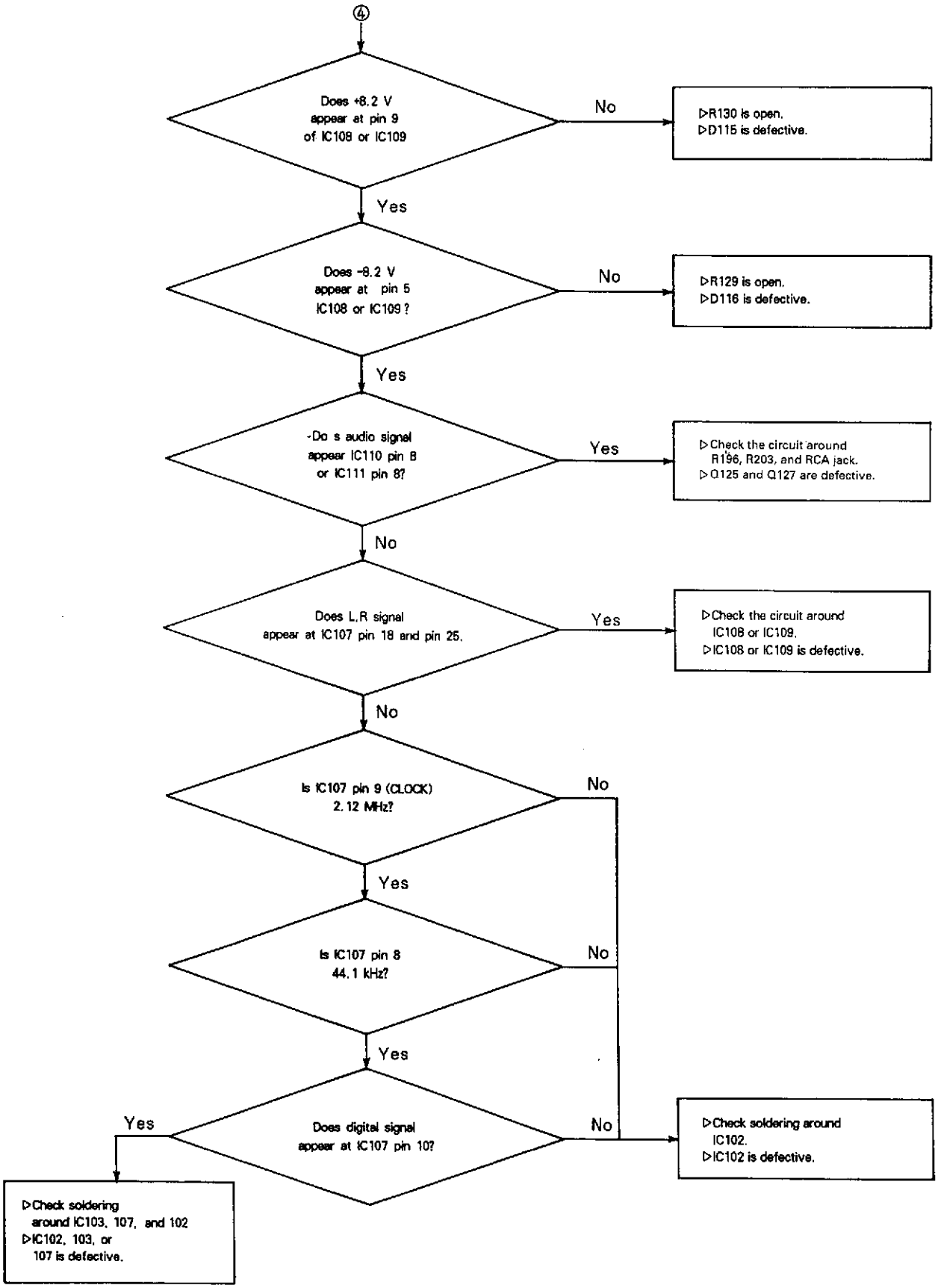


Figure 23

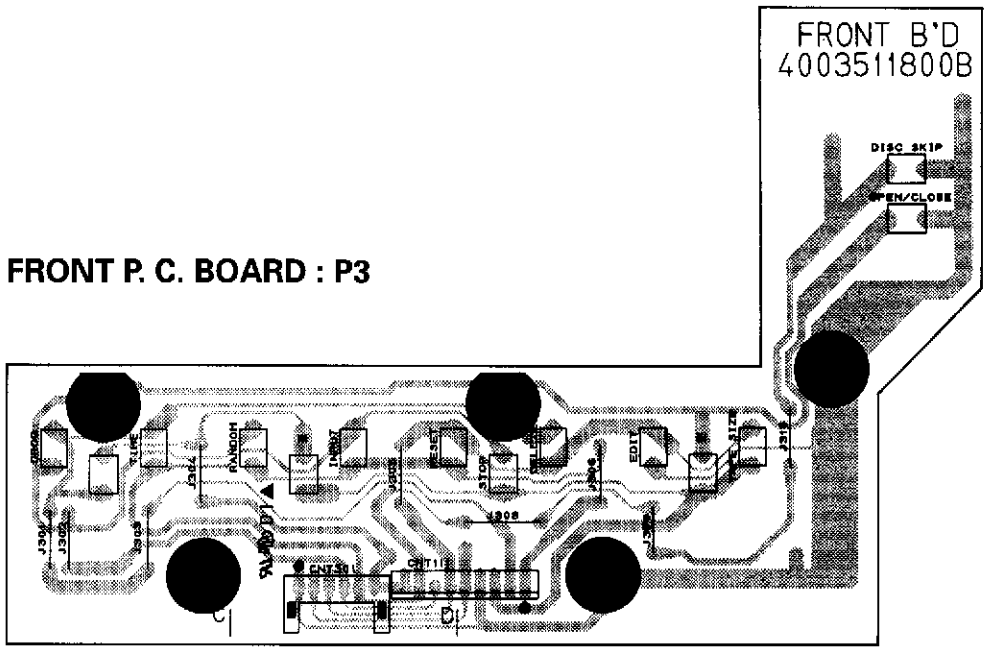
No sound signal.


④
Does +8.2 V appear at pin 9 of IC108 or IC109
No
▷R130 is open.
▷D115 is defective.
Yes
Does -8.2 V appear at pin 5 IC108 or IC109?
No
▷R129 is open.
▷D116 is defective.
Yes
-Do s audio signal appear IC110 pin 8 or IC111 pin 8?
Yes
▷Check the circuit around R196, R203, and RCA jack.
▷Q125 and Q127 are defective.
No
Does L,R signal appear at IC107 pin 18 and pin 25.
Yes
▷Check the circuit around IC108 or IC109.
▷IC108 or IC109 is defective.
No
Is IC107 pin 9 (CLOCK) 2.12 MHz?
No
Yes
Is IC107 pin 8 44.1 kHz?
No
Yes
Does digital signal appear at IC107 pin 10?
No
▷Check soldering around IC102.
▷IC102 is defective.
Yes
▷Check soldering around IC103, 107, and 102
▷IC102, 103, or 107 is defective.

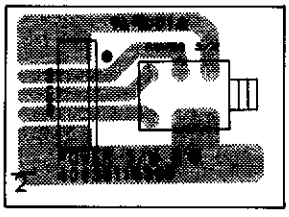
PRINTED CIRCUIT BOARDS

Model No. : FL-8400

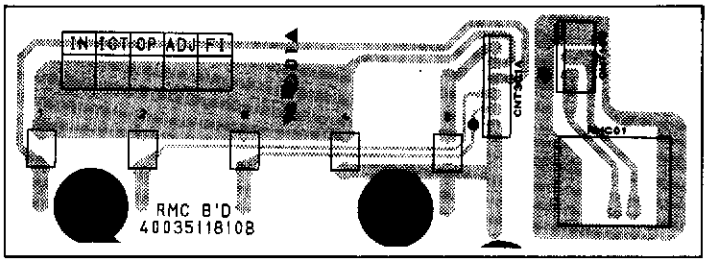
FRONT P. C. BOARD : P3



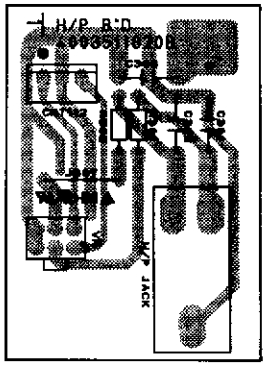
POWER S/W P. C. BOARD : P3-3



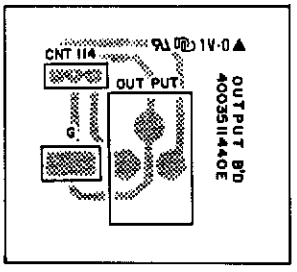
RMC P. C. BOARD : P3-1



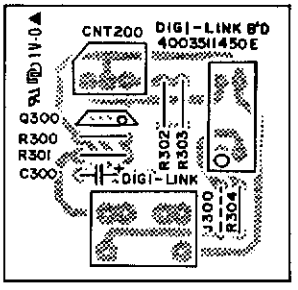
HEAD PHONE P. C. BOARD P3-2



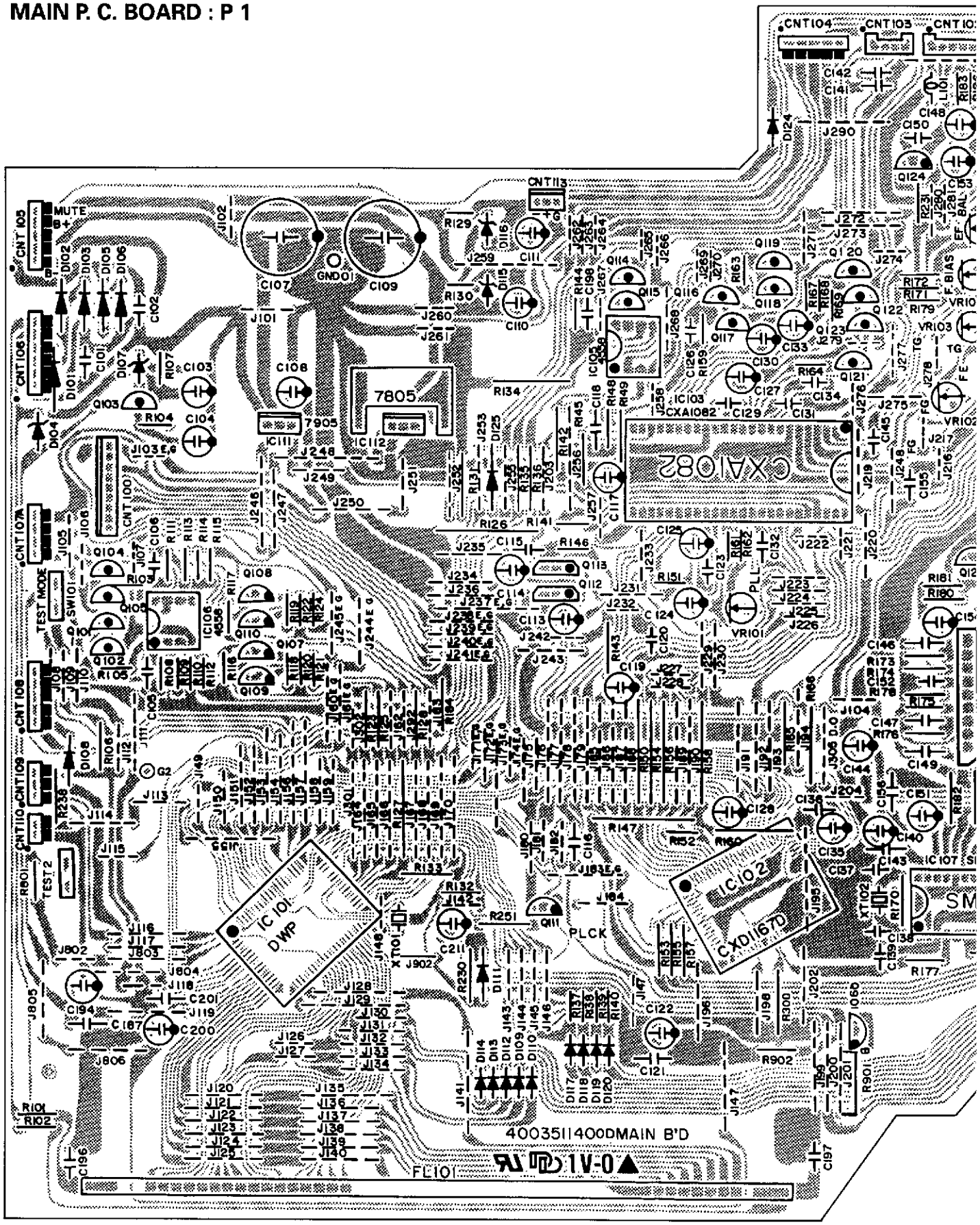
OUTPUT P. C. BOARD P1-4

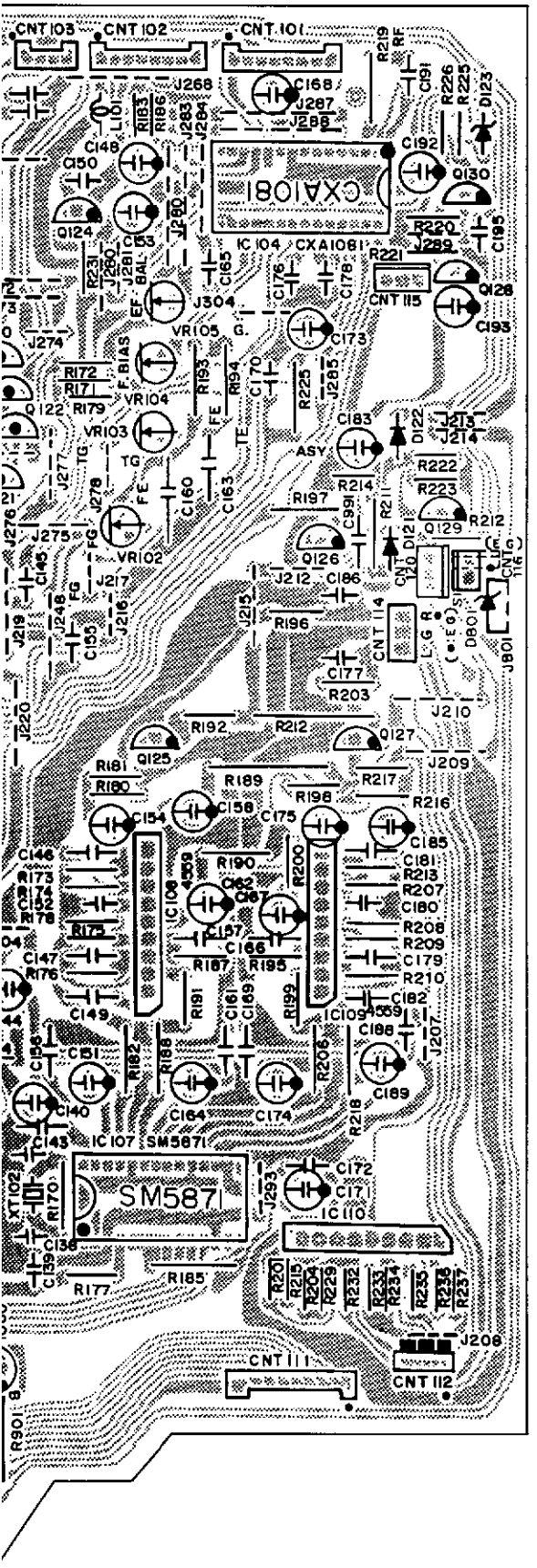


DIGI-LINK P.C.BOARD P1-5

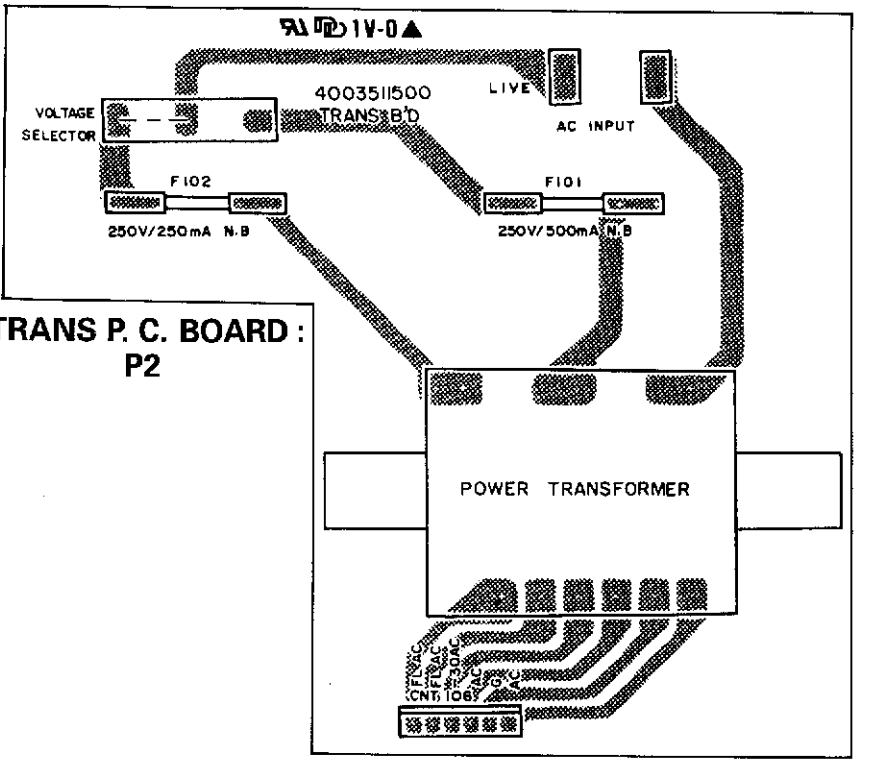


MAIN P. C. BOARD : P 1

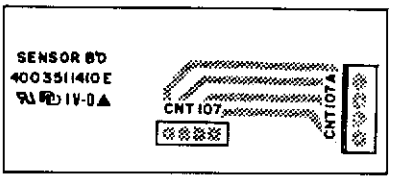




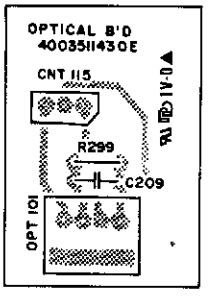
TRANS P. C. BOARD : P2



SENSORA P. C. BOARD : P1-1

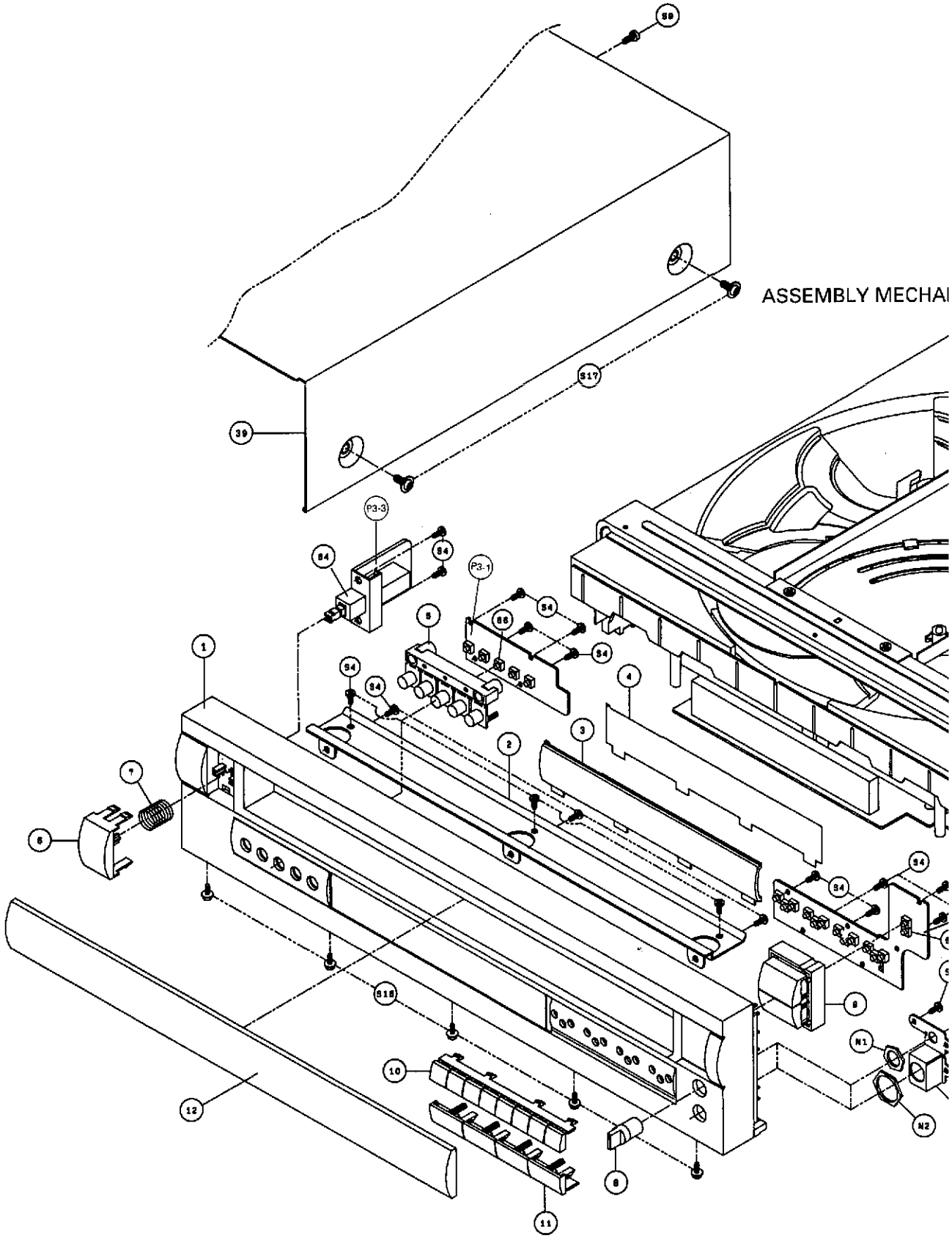


OPTICAL P. C. BOARD : P1-3

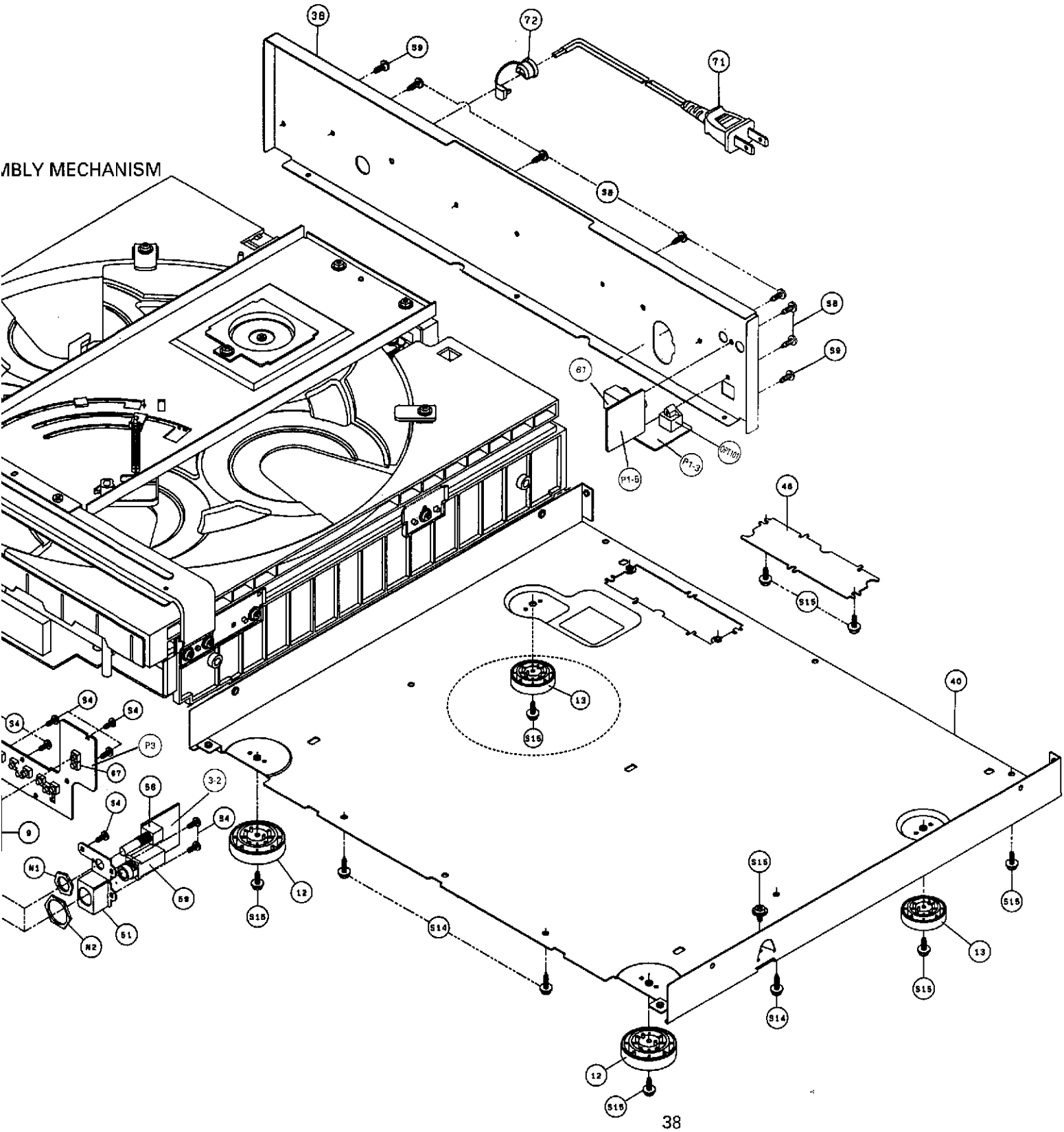


GENERAL UNIT EXPLODED VIEW

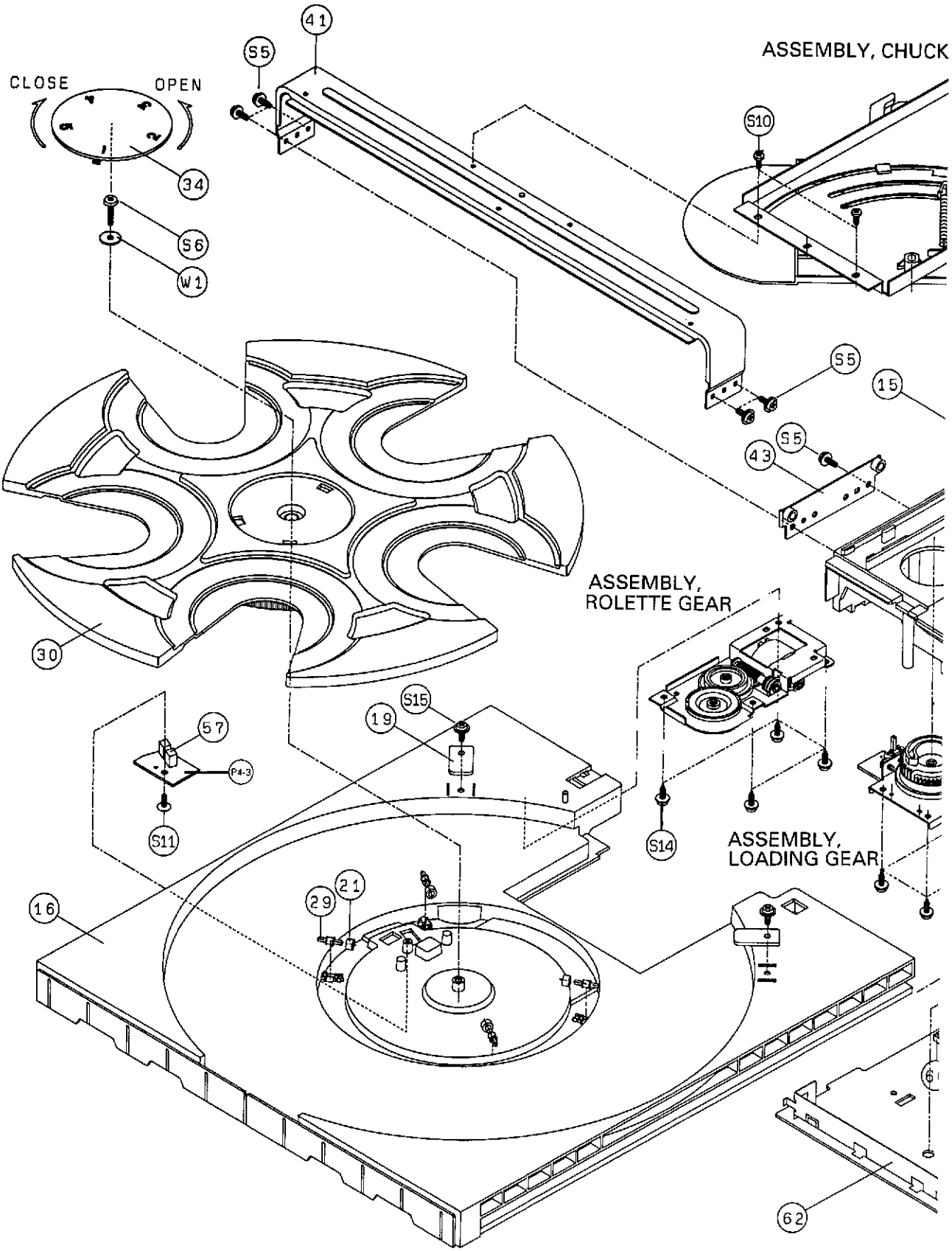
CABINET AND CHASSIS



MBLY MECHANISM



MECHANISM


CLOSE
OPEN
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S5
ASSEMBLY, CHUCK
S10
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S6
W1
S5
15
S5
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ASSEMBLY,
ROLETTE GEAR
30
S15
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S14
ASSEMBLY,
LOADING GEAR
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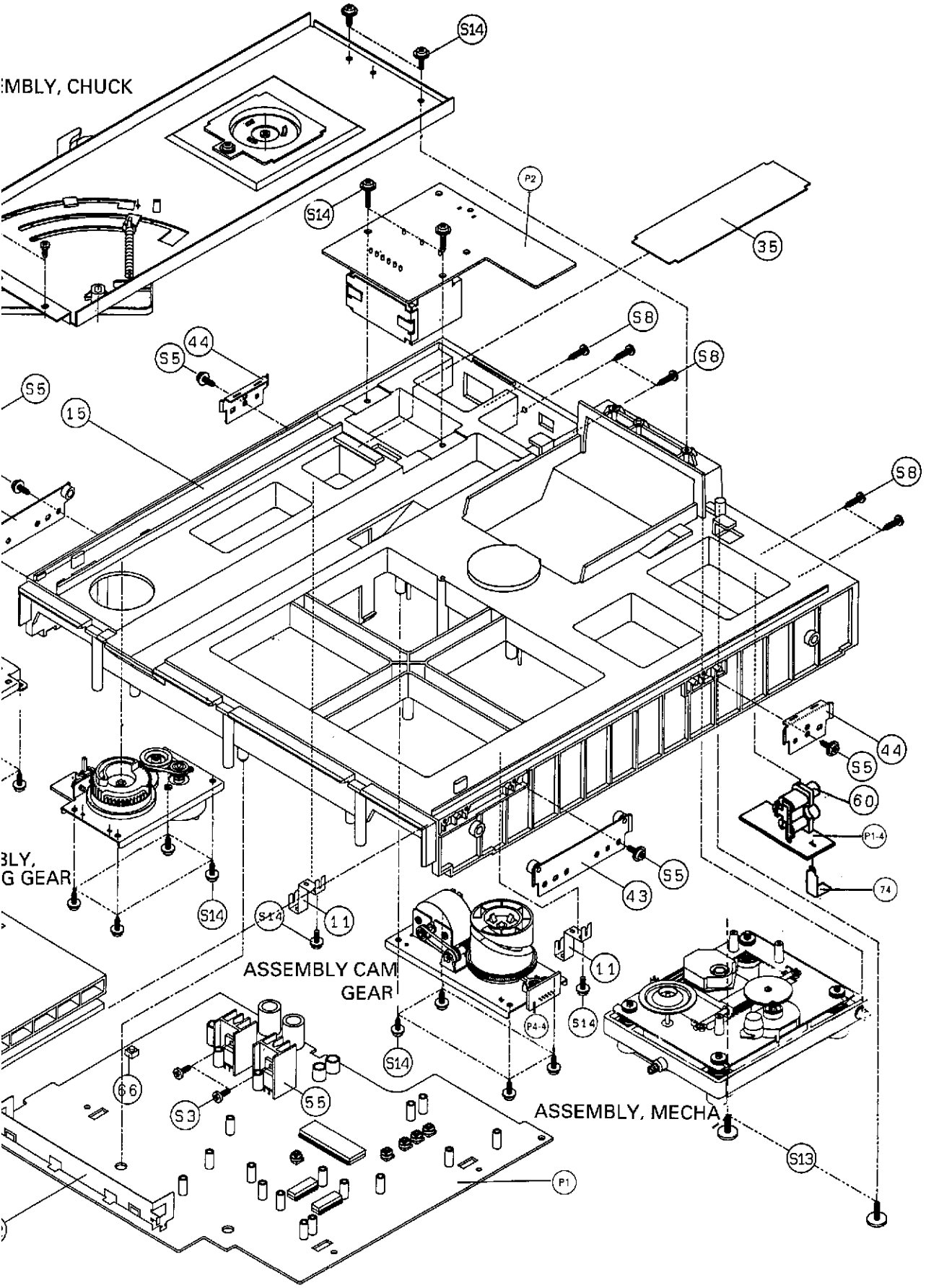
:MBLY, CHUCK
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S8
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15
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P1-4
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BLY,
G GEAR
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ASSEMBLY CAM
GEAR
P4-4
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ASSEMBLY, MECHA
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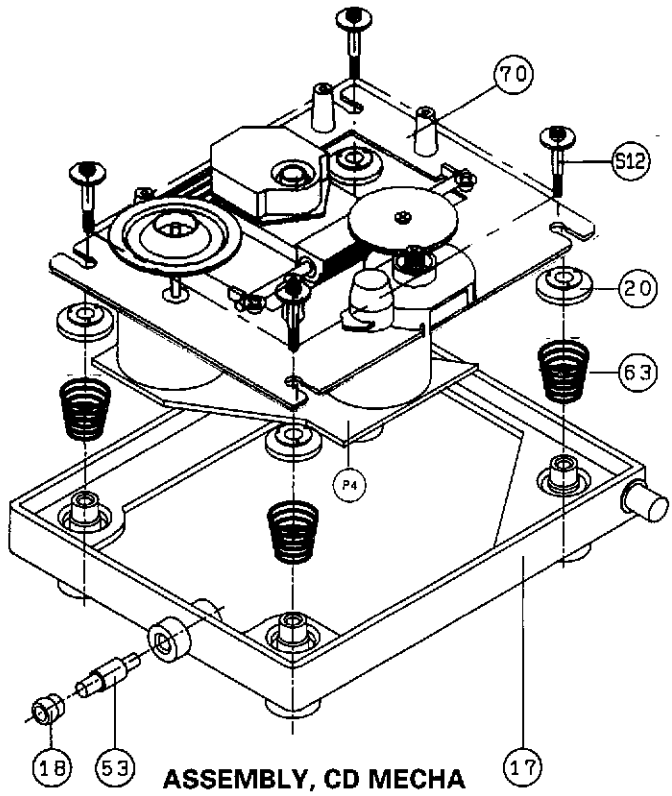
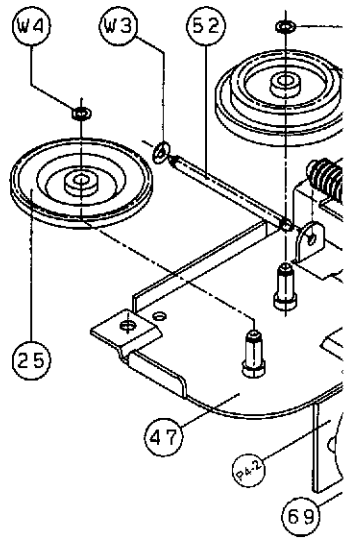
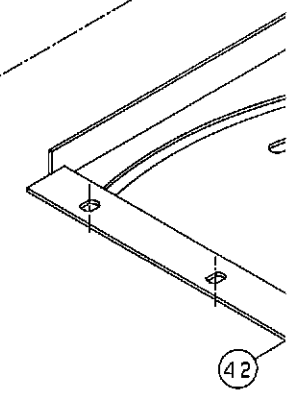
MECHANISM ASSEMBLES



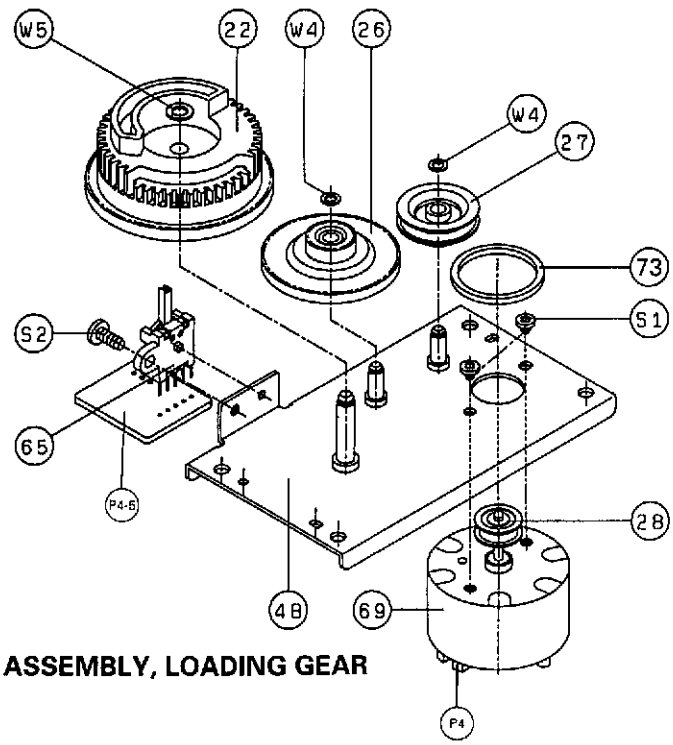
ASSEMBLY, CD MECHA



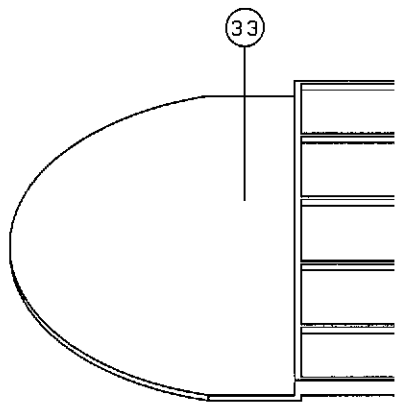
ASSEMBLY, ROULETTE GEAR

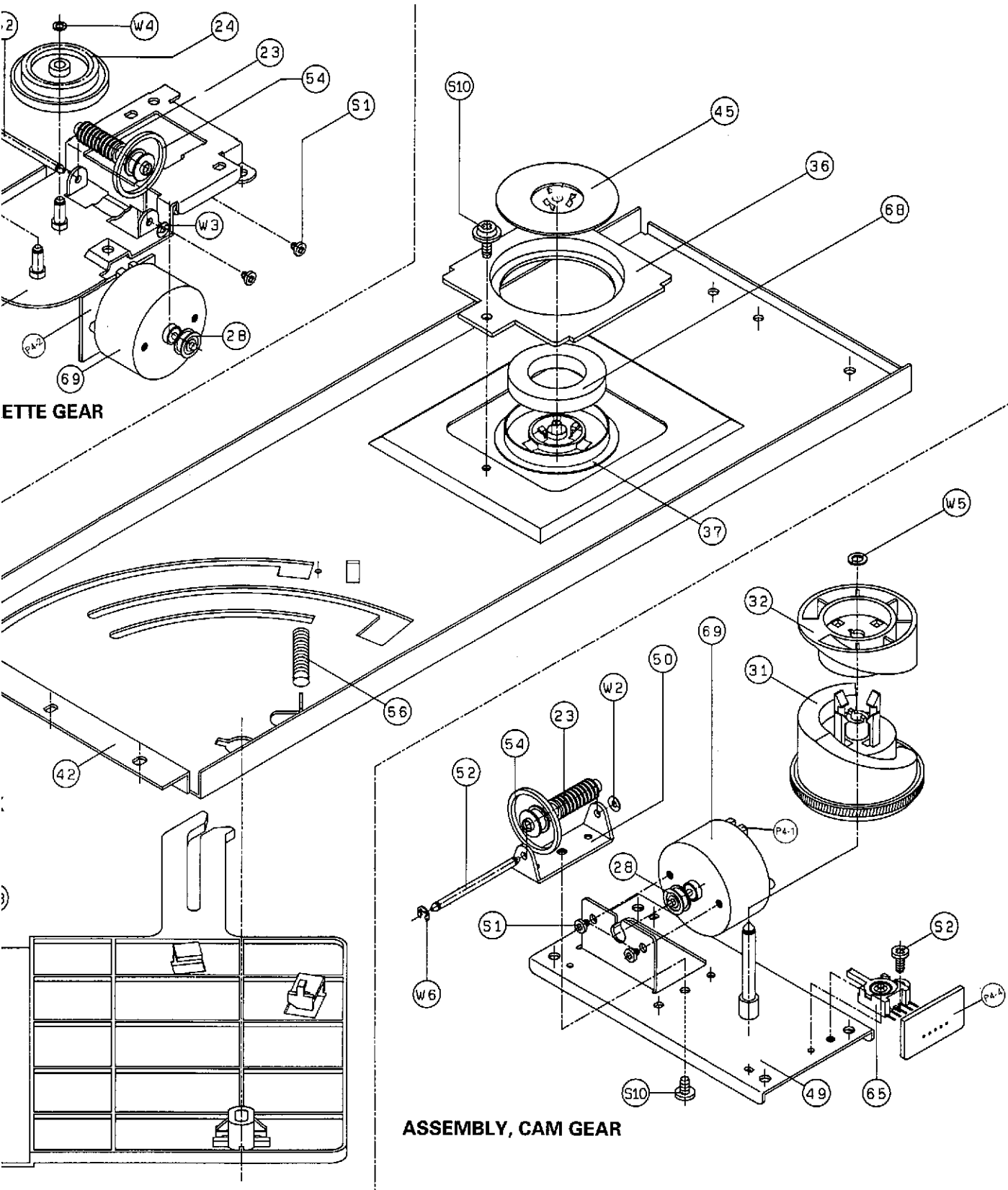


ASSEMBLY, CHUCK



ASSEMBLY, LOADING GEAR

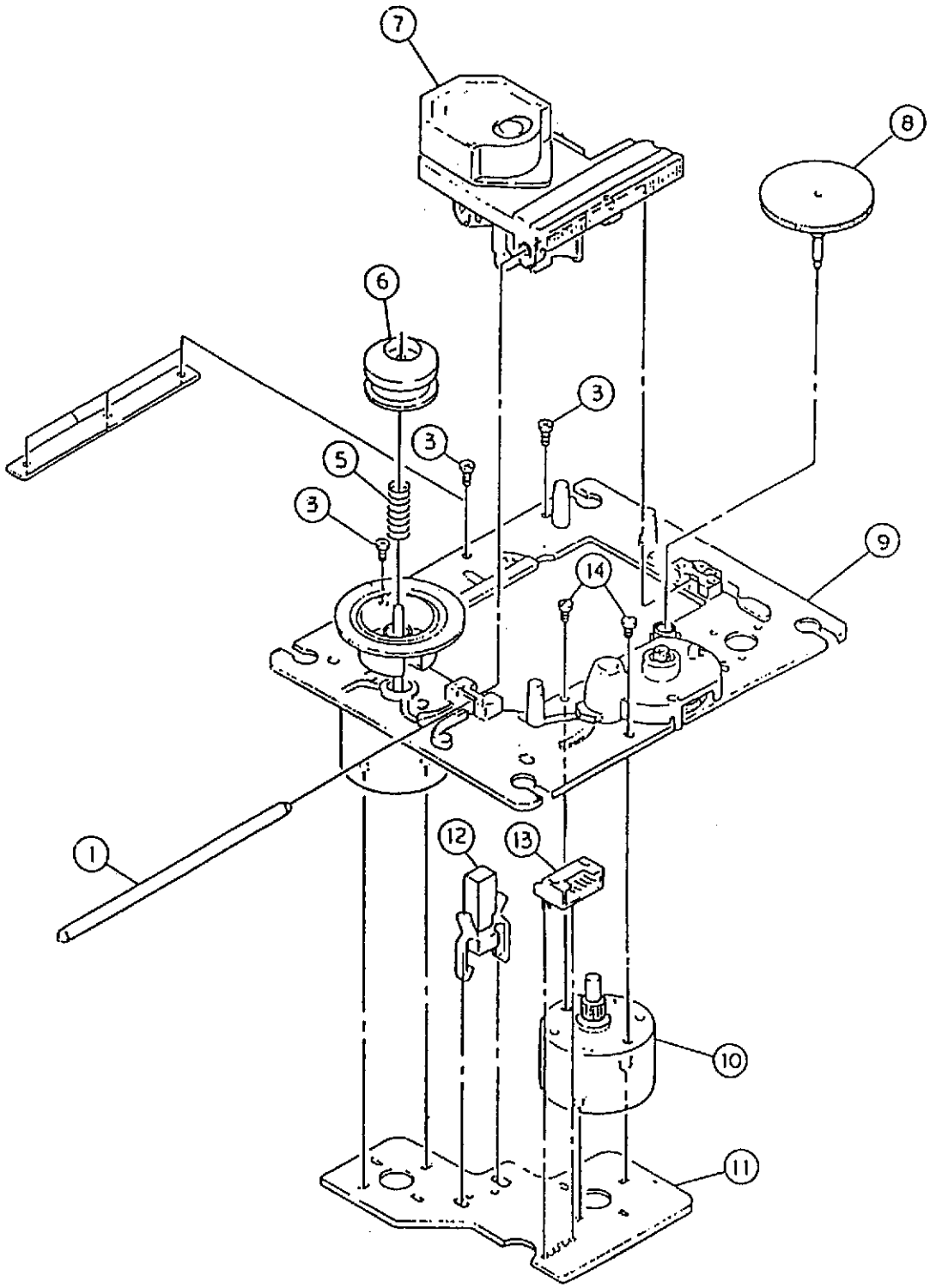




ETTE GEAR

ASSEMBLY, CAM GEAR

CD MECHANISM (KSM-2101A-AM)



GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
8	048545087411	Knob, Rotary
13	046033102511	Foot, (H. S)
14	6035101510	Foot, Base
15	6020600010	Body, Mecha
16	6020800010	Tray, Roulette
19	6065104120	Cover, Drop
21	6715018820	Rubber, Roller
29	7115003210	Roller, Roulette
30	7121400220	Roulette
34	048583004121	Cover, Roulette
35	8585006040	Cover, Power B'D
38	046102040521	Chassis, Back
39	046122022011	Cover, Top
40	6121606610	Chassis, Main
41	6122631530	Frame, Body
43	6143001120	Guide, Tray F
44	6145002120	Guide, Tray B
46	6165138410	Cover, Fuse
55	7505206110	Heatsink, Regulator TR
57	2408001111	Sensor, Photo, SG-2
58	3208067210	VR, Level
59	4438005010	Jack, Phone, ABS, Gold
60	4438103010	Jack, RCA 2P
61	4438007510	Jack, Multi
62	6513004420	Holder, FIP
64	4628055810	SW, Push Power
66	4658003710	SW, Tact, SKHV10910D01
67	4658004410	SW, Tact, EVQ-PJJ-05T
71⚠	4308001410	AC Cord, EHD-0008-266P, 2000mm, Black
72	6518000710	Stopper, Cord
74	6505139410	Bracket, Ground
		CONNECT LEAD ASSEMBLIES
(CNT101)	4358508201	Lead Ass'y 8P, 200 mm, CD mecha to Main B'D
(CNT102)	4358508202	Lead Ass'y 8P 200 mm, CD mecha to Main B'D, White and blue
(CNT103)	4358504105	Lead Ass'y 4P, 100 mm, CD mecha to Main B'D,
(CNT107)	4358504290	Lead Ass'y 4P 290mm, with tube, yellow, Ass'y Roulette gear to Sensor Motor B'D,
S3	8109230081	Screw #2BTC 3x8Y
S4	8109230083	Screw #2BTC 3x8B
S5	8109230101	Screw #2BTC 3x10Y
S6	8109230161	Screw #2BTC 3x16Y
S7	8109626051	Screw #2BT 2.6x5Y
S8	8119130123	Screw #1PTC 3x12B
S9	8119230103	Screw #2PTC 3x10B
S10	8119430051	Screw SAM 3x5Y
S11	8129126103	Screw #1FT 2.6x10B
S13	8155001210	Screw Mecha
S14	8159130121	Screw #1WPTC 3x12
S15	8159230081	Screw #2WPTC 3x8Y
S16	8159230083	Screw #2WPTC 3x8B
S17	8159440083	Screw WSAM 4x8B
W1	8305003810	Washer, Plain Ø14

058501001854 ASSEMBLY FRONT PANEL

1	048501033011	Panel, Front
2	6503030110	Bracket, Support
3	048553019411	Window, Display
4	048553019511	Filter, F/L
5	048543058511	Button, Display
6	048545123311	Button, Power
7	6555004380	Spring, Button
9	048545123411	Button, Play
10	048543058311	Button, Function (A)
11	048543058411	Button, Function (B)
12	048562005111	Door, Tray
51	6505137010	Bracket, Phone
S4	8109230083	Screw #2BTC 3x8B

055708000408 Sub Ass'y "A", CD mechanism

17	6022601810	Base D. U.
18	6065105610	Rolling Cap
20	6715018420	Rubber Damping
53	7005007230	Shaft Base D. U.
63	6555009220	Spring Damping
70	5708012910	CD Mecha KSM-2101A-AM
S12	8155001110	Screw Damping

056500000025 Sub Ass'y "B", Roulette Gear

23	7103000910	Worm
24	7103001110	Gear, Roulette
25	7103001210	Gear, Idle
28	7113001310	Pulley, Motor
47	6503019420	Bracket, Roulette
52	7005007110	Shaft, Worm
54	7165002420	Belt, 18x1.5x1.5
69	5558200310	Motor, RF-500TB-14415
S1	8009126031	Screw BM 2.6x3Y
W3	8338300710	Washer, Poly, 2.1x5x0.5
W4	8338300810	Washer, Poly, 2.6x6x0.5
P4-2	**4002517720**	**P.C.B Skip Motor**
CNT107	4428515410	Wafer 4P
CNT201	4428505710	Wafer 3P
C302	3509222233	Ceramic Disc 0.002 uF 50 V J
	3069151970	Cabon Film 150 ohm 1/5 W J
	3069103970	Cabon Film 10 kohm 1/5 W J

056500000016 Sub Ass'y "C", Loading Gear

CNT104	4358105203	Lead Ass'y 5P 200mm, to Main B'D
22	7102000110	Gear, Loading
26	7103001310	Gear, Center
27	7103001420	Gear, Pulley 2
28	7113001310	Pulley, Motor
48	6503019520	Bracket, Loading (2)
73	7165002210	Belt, 25x1.5x1.5
69	5558200310	Motor, RF-500TB-14415
S1	8009126031	Screw BM 2.6x3Y
S2	8009126061	Screw BM 2.6x6Y
W4	8338300810	Washer, Poly, 2.6x6x0.5
W5	8338300910	Washer, Poly, 3.2x6x0.5
P4	**4002517700**	**P.C.B Motor**
65	4638003210	SW, Lever, SSCF21028A
P4-5	**4002517750**	**P.C.B IN/OUT Leaf**

056500000017 Sub Ass'y "D", Cam Gear

CNT108	4358105204	Lead Ass'y 5P 200mm, to Main B'D
23	7103000910	Worm
28	7113001310	Pulley, Motor
31	7142000210	Cam Gear
32	7142000310	Cam Cover
49	6503019610	Bracket, Cam

Ref. No.	Part No.	Description
50	6505105610	Bracket, Worm 2
52	7005007110	Shaft, Worm
54	7165002420	Belt, 18x1.5x1.5
69	5558200310	Motor, RF-500TB-14415
S1	8009126031	Screw BM 2.6x3Y
S2	8009126061	Screw BM 2.6x6Y
S10	8119430051	Screw SAM 3x5Y
W2	8338300610	Washer, Poly, 2.1x5x0.3
W5	8338300910	Washer, Poly, 3.2x6x0.5
W6	8339020011	Washer, E-Ring Ø2
P4-1	**4002517710**	**P.C.B Chucking**
65	4638003210	SW, Lever, SSCF21028A
P4-4	**4002517740**	**P.C.B Up/Down Leaf**

	056120000008	**Sub Ass'y "E", Chuck**
33	8582001020	Cover, Disc
36	6043008410	Guide, Chuck
37	6063103010	Base, Magnet
42	6125000120	Chassis, Chuck
45	6023408610	Cover, Magnet
68	5125000910	Magnet, Ferrite
56	6555306110	Spring, Cover
S7	8109626051	Screw #2BT 2.6x5Y
S10	8119430051	Screw SAM 3x5Y

CD MECHANISM (KSM-2101A-AM)

Ref. No.	Part No.	Description
1	5798900002	Shaft, Slide
3/4		Not Used.
5	5798900003	Spring T/T
6	5798900004	Centering L/O
7	5798900001	Pick-up, KSS-210A (S)-RP
8	5798900005	Gear A
9	5798900006	T/T Chassis Assembly (MT)
10	5798900007	Motor Gear Assembly (MT)
11	5798900008	P.C.B Motor
12	5798900009	Switch, Leaf
13	5798900010	Wafer 4P
14	8019120031	Screw PM 2x3 ZNY

The following parts are only for European version.

Ref. No.	Part No.	Description
38	046102040521	Chassis, Back
71⚠	4308001410	AC Cord, EHD-0008-266P, 2000mm, Black
72	6518000710	Stopper, Cord

PRODUCT SAFETY NOTICE

Each precaution in this manual should be follower during servicing. Components identified with the IEC symbol ⚠ in the parts list and the safety can be of special significance. When replacing a component identified with ⚠, use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returing the product to the customer.

ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTICE: Products marked with ⚠ have special characteristics important to safety.
If you replace of these components, read carefully the product safety notice in this manual.
Don't degrade the safety of the product though improper servicing.
Resistor/Capacitor Tolerance, D: (±0.5%), J: (±5%), K: (±10%), M: (±20%), Z: (+80, -20%).

Ref. No.	Part No.	Description			
	054041010001	**ASS'Y P.C.B MAIN**			
		Miscellaneous			
55	7505206110	Heatsink, REG TR			
62	6513004420	Holder FIP			
66	4658003710	SW Tact, SKHV10910D01			
		Capacitors			
C101/102	3519473935	Ceramic tubular	0.047 uF	50 V J	
C103/104	3479347071	Electrolytic SG	47 uF	50 V M	
C105/106	3519471935	Ceramic tubular	470 pF	50 V J	
C107 ⚠	3409322249	Electrolytic SG	2200 uF	16 V M	
C108	3479310121	Electrolytic SG	100 uF	10V M	
C109 ⚠	3409322249	Electrolytic SG	2200 uF	16 V M	
C110/111	3479322141	Electrolytic SG	220 uF	25V M	
C113	3479310121	Electrolytic SG	100 uF	10V M	
C114	3479310971	Electrolytic SG	1 uF	50 V M	
C115	3519103915	Ceramic tubular	1000 pF	16 V J	
C116	3519102935	Ceramic tubular	0.001 uF	50 V J	
C117	3479347041	Electrolytic SG	47 uF	25 V M	
C118	3519472915	Ceramic tubular	4700 pF	16 V J	
C119	3479347871	Electrolytic SG	0.47 uF	50 V M	
C120	3679333120	Mylar	0.033 uF	100V J	
C121	3519473935	Ceramic tubular	0.047 uF	50 V J	
C122	3479347041	Electrolytic SG	47 uF	25 V M	
C123	3679472120	Mylar	0.005 uF	100V J	
C124	3479347041	Electrolytic SG	47 uF	25 V M	
C125	3479347971	Electrolytic SG	0.047 uF	50 V M	
C126	3679153120	Mylar	0.015 uF	100V J	
C127	3479333971	Electrolytic SG	3.3 uF	50 V M	
C128	3479310121	Electrolytic SG	100 uF	10V M	
C129	3679104122	Mylar	0.1 uF	100V J	
C130	3479333971	Electrolytic SG	3.3 uF	50 V M	
C131	3679473120	Mylar	0.047 uF	100V J	
C132	3519102935	Ceramic tubular	0.001 uF	50 V J	
C133	3479322071	Electrolytic SG	22 uF	50 V M	
C134	3679104122	Mylar	0.1 uF	100V J	
C135	3479347041	Electrolytic SG	47 uF	25 V M	
C136	3519223935	Ceramic tubular	0.022 uF	50 V J	
C137/138	3529330210	Ceramic Disc	33 pF	50 V J	
C139	3519220935	Ceramic tubular	22 pF	50 V J	
C140	3479347041	Electrolytic SG	47 uF	25 V M	
C141/142	3519561935	Ceramic tubular	560 pF	50 V J	
C143	3519473935	Ceramic tubular	0.047 uF	50 V J	
C144	3479347041	Electrolytic SG	47 uF	25 V M	
C145	3679222120	Mylar	0.002 uF	100V J	
C146	3519221935	Ceramic tubular	220 pF	50 V J	
C147	3519101935	Ceramic tubular	100 pF	50 V J	
C148	3479347041	Electrolytic SG	47 uF	25 V M	
C149	3519221935	Ceramic tubular	220 pF	50 V J	
C150	3679222120	Mylar	0.002 uF	100V J	
C151	3479347041	Electrolytic SG	47 uF	25 V M	
C152	3679222120	Mylar	0.002 uF	100V J	
C153/154	3479347041	Electrolytic SG	47 uF	25 V M	
C155	3519473935	Ceramic tubular	0.047 uF	50 V J	
C156	3519473935	Ceramic tubular	0.047 uF	50 V J	
C157	3519101935	Ceramic tubular	100 pF	50 V J	
C158	3479347041	Electrolytic SG	47 uF	25 V M	
C160	3519472915	Ceramic tubular	4700 pF	16 V J	
C161	3519473935	Ceramic tubular	0.047 uF	50 V J	
C162	3479347041	Electrolytic SG	47 uF	25 V M	
C163	3519561935	Ceramic tubular	560 pF	50 V J	
C164	3479347041	Electrolytic SG	47 uF	25 V M	
C165	3679333120	Mylar	0.033 uF	100V J	
C166	3519101935	Ceramic tubular	100 pF	50 V J	
C167/168	3479347041	Electrolytic SG	47 uF	25 V M	
C169	3519473935	Ceramic tubular	0.047 uF	50 V J	
C170	3679103120	Mylar	0.01 uF	100V J	
C171	3479347041	Electrolytic SG	47 uF	25 V M	
C172	3519473935	Ceramic tubular	0.047 uF	50 V J	
C173	3479347871	Electrolytic SG	0.47 uF	50 V M	
C174/175	3479347041	Electrolytic SG	47 uF	25 V M	
C176	3679333120	Mylar	0.033 uF	100V J	
C177	3679222120	Mylar	0.002 uF	100V J	
C178	3679103120	Mylar	0.01 uF	100V J	
C179	3519101935	Ceramic tubular	100 pF	50 V J	
C180	3679222120	Mylar	0.002 uF	100V J	
C181/182	3519221935	Ceramic tubular	220 pF	50 V J	
C183	3479310071	Electrolytic SG	10 uF	50 V M	
C185	3479347041	Electrolytic SG	47 uF	25 V M	
C186	3679222120	Mylar	0.002 uF	100V J	
C187	3519473935	Ceramic tubular	0.047 uF	50 V J	
C188	3519473935	Ceramic tubular	0.047 uF	50 V J	
C189	3479347041	Electrolytic SG	47 uF	25 V M	
C191	3519103915	Ceramic tubular	10000 pF	16 V J	
C192	3479347041	Electrolytic SG	47 uF	25 V M	
C193	3479347871	Electrolytic SG	0.47 uF	50 V M	
C194	3479333061	Electrolytic SG	33 uF	35 V M	
C195	3679222120	Mylar	0.002 uF	100V J	
C198	3519102935	Ceramic tubular	0.001 uF	50 V J	
C200	3479347041	Electrolytic SG	47 uF	25 V M	
C201	3519473935	Ceramic tubular	0.047 uF	50 V J	
C209	3519223935	Ceramic tubular	0.022 uF	50 V J	
C211	3479333971	Electrolytic SG	3.3 uF	50 V M	
C901	3519473935	Ceramic tubular	0.047 uF	50 V J	
		Resistors			
R101/102	3069479970	Carbon Film	4.7 ohm	1/5 W J	
R103	3069100970	Carbon Film	10 ohm	1/5 W J	
R104	3069472970	Carbon Film	4.7 kohm	1/5 W J	
R105	3069100970	Carbon Film	10 ohm	1/5 W J	
R106	3069473970	Carbon Film	4.7 kohm	1/5 W J	
R107	3069103970	Carbon Film	10 kohm	1/5 W J	
R108	3069154970	Carbon Film	150 kohm	1/5 W J	
R109	3069104970	Carbon Film	100 kohm	1/5 W J	
R110	3069154970	Carbon Film	150 kohm	1/5 W J	
R111-115	3069104970	Carbon Film	100 kohm	1/5 W J	
R116-125	3069512970	Carbon Film	5.1 kohm	1/5 W J	
R126	3069223970	Carbon Film	22 kohm	1/5 W J	
R127/128	3069512970	Carbon Film	5.1 kohm	1/5 W J	
R129/130 ⚠	3069101275	Metal Film	100 ohm	1/4W J	
R131	3069103970	Carbon Film	10 kohm	1/5 W J	
R133	3069103970	Carbon Film	10 kohm	1/5 W J	
R134	3069104970	Carbon Film	100 kohm	1/5 W J	
R135	3069753970	Carbon Film	75 kohm	1/5 W J	
R136	3069104970	Carbon Film	100 kohm	1/5 W J	
R137-140	3069513970	Carbon Film	51 kohm	1/5 W J	
R141	3069473970	Carbon Film	4.7 kohm	1/5 W J	
R142	3069472970	Carbon Film	4.7 kohm	1/5 W J	
R143	3069105970	Carbon Film	1 Moh	1/5 W J	
R144/145	3069104970	Carbon Film	100 kohm	1/5 W J	
R146	3069102970	Carbon Film	1 kohm	1/5 W J	

Ref. No.	Part No.	Description
R147	3069104970	Carbon Film 100 kohm 1/5 W J
R148	3069474970	Carbon Film 470 kohm 1/5 W J
R149	3069822970	Carbon Film 8.2 kohm 1/5 W J
R150	3069203970	Carbon Film 20 kohm 1/5 W J
R151/152	3069104970	Carbon Film 100 kohm 1/5 W J
R153	3069681970	Carbon Film 680 ohm 1/5 W J
R154	3069102970	Carbon Film 1 kohm 1/5 W J
R155	3069681970	Carbon Film 680 ohm 1/5 W J
R156	3069103970	Carbon Film 10 kohm 1/5 W J
R157	3069681970	Carbon Film 680 ohm 1/5 W J
R158	3069103970	Carbon Film 10 kohm 1/5 W J
R159	3069124970	Carbon Film 120 kohm 1/5 W J
R160	3069104970	Carbon Film 100 kohm 1/5 W J
R161	3069124970	Carbon Film 120 kohm 1/5 W J
R162	3069362970	Carbon Film 3.6 kohm 1/5 W J
R163	3069332970	Carbon Film 3.3 kohm 1/5 W J
R164	3069104970	Carbon Film 100 kohm 1/5 W J
R165	3069103970	Carbon Film 10 kohm 1/5 W J
R166	3069223970	Carbon Film 22 kohm 1/5 W J
R167	3069153970	Carbon Film 15 kohm 1/5 W J
R168/169	3069823970	Carbon Film 82 kohm 1/5 W J
R170	3069105970	Carbon Film 1 ohm 1/5 W J
R171	3069103970	Carbon Film 10 kohm 1/5 W J
R172	3069223970	Carbon Film 22 kohm 1/5 W J
R173/174	3069682970	Carbon Film 6.8 kohm 1/5 W J
R175	3069752970	Carbon Film 7.5 kohm 1/5 W J
R176	3069243970	Carbon Film 24 kohm 1/5 W J
R177	3069331970	Carbon Film 330 ohm 1/5 W J
R178	3069682970	Carbon Film 6.8 kohm 1/5 W J
R179	3069103970	Carbon Film 10 kohm 1/5 W J
R180	3069681970	Carbon Film 680 ohm 1/5 W J
R181	3069104970	Carbon Film 100 kohm 1/5 W J
R182	3069103970	Carbon Film 10 kohm 1/5 W J
R183	3069101970	Carbon Film 100 ohm 1/5 W J
R184	3069103970	Carbon Film 10 kohm 1/5 W J
R185/186	3069102970	Carbon Film 1 kohm 1/5 W J
R187	3069243970	Carbon Film 24 kohm 1/5 W J
R188	3069103970	Carbon Film 10 kohm 1/5 W J
R189/190	3069470970	Carbon Film 47 ohm 1/5 W J
R191	3069752970	Carbon Film 7.5 kohm 1/5 W J
R192	3069102970	Carbon Film 1 kohm 1/5 W J
R193/194	3069472970	Carbon Film 4.7 kohm 1/5 W J
R195	3069243970	Carbon Film 24 kohm 1/5 W J
R196	3069101970	Carbon Film 100 ohm 1/5 W J
R197	3069102970	Carbon Film 1 kohm 1/5 W J
R198	3069470970	Carbon Film 47 ohm 1/5 W J
R199	3069752970	Carbon Film 7.5 kohm 1/5 W J
R200	3069470970	Carbon Film 47 ohm 1/5 W J
R201	3069220970	Carbon Film 22 ohm 1/5 W J
R203	3069101970	Carbon Film 100 ohm 1/5 W J
R204	3069272970	Carbon Film 2.7 kohm 1/5 W J
R205	3069104970	Carbon Film 100 kohm 1/5 W J
R206	3069103970	Carbon Film 10 kohm 1/5 W J
R207/208	3069682970	Carbon Film 6.8 kohm 1/5 W J
R209	3069752970	Carbon Film 7.5 kohm 1/5 W J
R210	3069243970	Carbon Film 24 kohm 1/5 W J
R211	3069103970	Carbon Film 10 kohm 1/5 W J
R212	3069102970	Carbon Film 1 kohm 1/5 W J
R213	3069682970	Carbon Film 6.8 kohm 1/5 W J
R214	3069104970	Carbon Film 100 kohm 1/5 W J
R215	3069362970	Carbon Film 3.6 kohm 1/5 W J
R216	3069104970	Carbon Film 100 kohm 1/5 W J
R217	3069681970	Carbon Film 680 ohm 1/5 W J
R218	3069103970	Carbon Film 10 kohm 1/5 W J
R219	3069243970	Carbon Film 24 kohm 1/5 W J
R220	3069102970	Carbon Film 1 kohm 1/5 W J
R221	3069473970	Carbon Film 4.7 kohm 1/5 W J
R222	3069183970	Carbon Film 18 kohm 1/5 W J
R223	3069153970	Carbon Film 15 kohm 1/5 W J
R225/226	3069102970	Carbon Film 1 kohm 1/5 W J
R227	3069104970	Carbon Film 100 kohm 1/5 W J
R229	3069183970	Carbon Film 18 kohm 1/5 W J
R231	3069220970	Carbon Film 22 ohm 1/5 W J
R233	3069272970	Carbon Film 2.7 kohm 1/5 W J
R234/235	3069183970	Carbon Film 18 kohm 1/5 W J
R236	3069220970	Carbon Film 22 ohm 1/5 W J
R237	3069362970	Carbon Film 3.6 kohm 1/5 W J
R238	3069473970	Carbon Film 4.7 kohm 1/5 W J
R251	3069332970	Carbon Film 3.3 kohm 1/5 W J
R299	3069822970	Carbon Film 8.2 kohm 1/5 W J
R300	3069681970	Carbon Film 680 ohm 1/5 W J

Variable Resistors

VR101	3248010243	Semi, 1k, PLL
VR102	3248020343	Semi, 20k, Focus Gain
VR103	3248020343	Semi, 20k, Tracking Gain
VR104	3248050343	Semi 50k, Focus Bias
VR105	3248020343	Semi 20k, EF Balance

Diodes

D101-103	2258100135	1N4002, Rectifier
D104	2258599107	Zener, UZ 9.1BSC, Rectifier
D105/106	2258100135	1N4002, Rectifier
D107	2258599128	Zener, UZ 30.0BSD, Rectifier
D108-110	2058322101	1N4148N, Switching (=2058306101)
D112-114	2058322101	1N4148N, Switching (=2058306101)
D115/116	2258599123	Zener, UZ 8.2BSB, Rectifier
D117-122	2058322101	1N4148N, Switching (=2058306101)
D123	2258599102	Zener, UZ 4.3BSB, Rectifier
D124/125	2058322101	1N4148N, Switching (=2058306101)

Transistors

Q101	2208606114	MPSA06, NPN
Q102-104	2208206113	MPSA56, PNP
Q105	2208606114	MPSA06, NPN
Q107-110	2208606104	KTC1815Y/KTC3198Y, NPN
Q111	2208606112	2SD1302S, NPN
Q112/113	2208622109	DTC144E, NPN
Q114	2208606114	MPSA06, NPN
Q115/116	2208206113	MPSA56, PNP
Q117	2208606114	MPSA06, NPN
Q118	2208206113	MPSA56, PNP
Q119/120	2208606114	MPSA06, NPN
Q121	2208206113	MPSA56, PNP
Q122	2208206113	MPSA56, PNP
Q123	2208606114	MPSA06, NPN
Q124	2208206105	KTA1015Y/KTA1266Y, PNP
Q125-128	2208606112	2SD1302S, NPN
Q129	2208206105	KTA1015Y/KTA1266Y, PNP
Q130	2208606112	2SD1302S, NPN

ICs

IC101	2138322177	DWP-311 CXP-82316-170Q, CPU
IC102	2138022110	CXD-1167Q, DSP
IC103	2138022112	CXA-1082BS
IC104	2138022111	CXA-1081S, R.F Amp
IC105/10	2168220103	NJM-4560D, OP Amp
IC107	2138099120	SM-5871AN, D/A Converter
IC108/10	2168206103	KIA-4559S/KIA-7559S, OP AmP
IC110	2168020101	NJM-4560S, OP Amp
IC111	2168602112	GL7905, Regulator
IC112	2168602105	GL7805, Regulator

Fluorescent

FL101	2328130311	FIP 4EN6

Ref. No.	Part No.	Description		
		X-TAL		
XT101	3938124010	Resonator, 10 MHz, CST10.0MTW-TF01		
XT102	3938101500	X-TAL, 16.9344 MHz		
		Inductor		
L101	2648610082	Coil, Fixed 10uH		
		Connectors		
CNT101	4428525580	Wafer 8P		
CNT102	4428525580	Wafer 8P		
CNT103	4428513460	Wafer 4P		
CNT104	4428513450	Wafer 5P		
CNT105	4428513450	Wafer 5P		
CNT106	4428513460	Wafer 6P		
CNT107A	4428513440	Wafer 4P		
CNT108	4428513450	Wafer 5P		
CNT109	4428513430	Wafer 3P		
CNT111	4428525590	Wafer 9P		
CNT112	4428513430	Wafer 3P		
CNT114	436103263321	Lead Ass'y 3P 260 mm, to Output B'D		
CNT120	436103222181	Lead Ass'y 3P 220 mm, to Output B'D		
	054041010002	**ASS'Y P.C.B SENSOR A**		
		Connectors		
CNT107	4428515410	Wafer 4P		
CNT107-A	4358104164	Lead Ass'y 4P 160mm, to Main B'D		
	054041010047	**P.C.B DIGI-LINK**		
		Miscellaneous		
61	4438007510	Jack, Multi		
		Connectors		
CNT200	4428513430	Wafer 3P		
		Capacitor		
C300	3479322041	Electrolytic SG	22 uF	25 V M
		IC		
IC300	2408000136	LTV-817		
		Transistor		
Q300	2238006103	KRA107M		
		Resistors		
R300	3069473970	Carbon Film	47 kohm	1/5 W J
R301	3069470970	Carbon Film	47 ohm	1/5 W J
R302	3069392970	Carbon Film	3.9 kohm	1/5 W J
R303	3069101970	Carbon Film	100 ohm	1/5 W J
R304	3069271970	Carbon Film	270 ohm	1/5 W J
	054041010048	**ASS'Y P.C.B LINE OUT**		
		Miscellaneous		
60	4438103010	Jack RCA 2P		
74	6505139410	Bracket, Ground		
		Connector		
CNT114	4428513430	Wafer 3P		
		Capacitor		
C400	3519472915	Ceramic Tubular	4700 pF	16 V J

Ref. No.	Part No.	Description		
	054040210013	**ASS'Y P.C.B POWER TRANS**		
		Miscellaneous		
	4255001010	Clip Fuse		
	4428001410	Pin Holder		
F102 ⚠	5508205231	Fuse, NB 350 mA 250 V (UL/C)		
TRANS ⚠	2828082801	Power transformer, 120 V 60 Hz		
		Connector		
CNT106	4358106162	Lead Ass'y 6P 160mm, to Main BD		
	054041010017	**ASS'Y P.C.B FRONT**		
		Miscellaneous		
66	4658003710	SW Tact, SKHV10910D01		
67	4658004410	SW Tact, EVQ-PJJ-05T		
		Connectors		
CNT111	4358509121	Lead Ass'y 9P 120mm to Main B'D		
CNT301	4428525560	Wafer 6P		
	054041010018	**ASS'Y P.C.B RMC/FUNCTION**		
		Miscellaneous		
66	4658003710	SW Tact, SKHV10910D01		
		Connectors		
CNT301A	436206303442	Lead Ass'y 6P 300mm to Front B'D		
CNT109	436103223441	Lead Ass'y 3P 220mm, to Main B'D		
		Sensor		
RMC01	2138000208	SBX1610-02, Remote Sensor		
	054041010019	**ASS'Y P.C.B. POWER SWITCH**		
		Miscellaneous		
64	4628055810	SW Push Power		
		Connector		
CNT103	4358105263	Lead Ass'y 5P 260mm, to Main B'D		
	054041010020	**ASS'Y P.C.B HEADPHONE**		
		Miscellaneous		
58	3208067210	VR, Level		
59	4438005010	Jack, Phone, ABS, Gold		
		Connector		
CNT112	4358103129	Lead Ass'y 3 P 120 mm, to Main B'D		
G	152622101057	Wire Lug #BK100		
		Capacitors		
C301/303	3519332935	Ceramic Tubular	0.003 uF	50 V J
		Resistors		
R301/302	3069560970	Carbon Film	56 ohm	1/5 W J
	054041010010	**ASS'Y P.C.B DISC SENSOR**		
		Miscellaneous		
57	2408001111	SG-2, Sensor Photo		
P4-3	**4002517730**	**P.C.B Disc Sensor**		

Ref. No.	Part No.	Description			
		Connectors			
CNT201	4358103247	Lead Ass'y 3P 200 mm, to Skip Motor B'D			
		Resistors			
R301	3069151970	Carbon Film	150 ohm	1/5 W	J
R302	3069103970	Carbon Film	10 kohm	1/5 W	J
	054041010021	**ASS'Y P.C.B OPTICAL**			
		Connector			
CNT115	4428505710	Wafer 3P			
		Resistor			
R229	3069822970	Carbon Film	8.2 kohm	1/5 W	J
		Capacitor			
C209	3519222935	Ceramic Tubular	0.022 uF	50 V	J
		Converter			
OPT101	2428000140	E/O PLT102, Converter, Digital Output			

The following parts are only for 230V version.

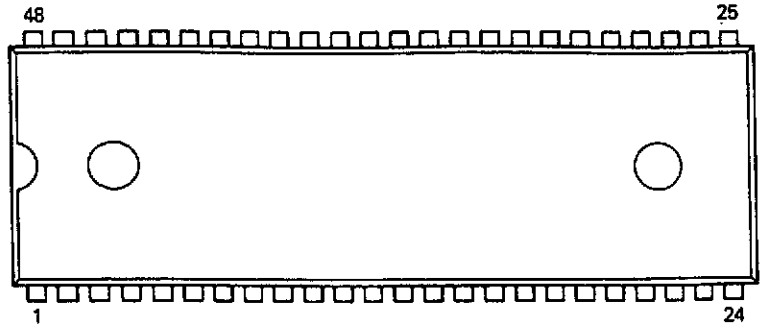
Ref. No.	Part No.	Description
	054040210027	**ASS'Y P.C.B POWER TRANS**
		Miscellaneous
	4255001010	Clip Fuse
	4428001410	Pin Holder
F102 ⚠	5508301035	Fuse, 5T 160 mA 250 V (SEMKO)
TRANS ⚠	2828009747	Power transformer, 230 V 50 Hz
		Connector
CNT106	4358106162	Lead Ass'y 6P 160mm, to Main BD

PRODUCT SAFETY NOTICE

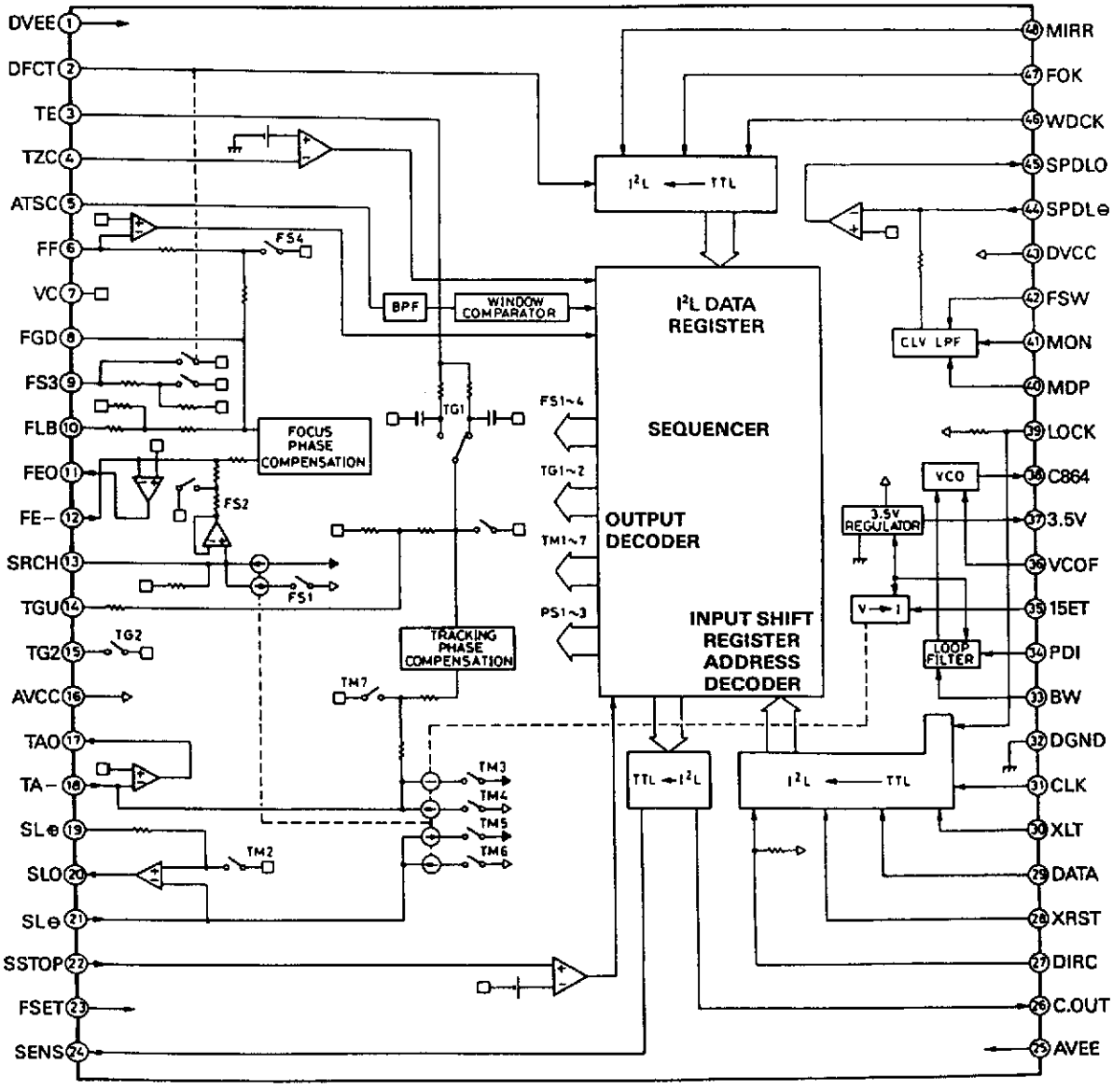
Each precaution in this manual should be follower during servicing. Components identified with the IEC symbol ⚠ in the parts list and the safety can be of special significance. When replacing a component identified with ⚠ , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returing the product to the customer.

IC FUNCTIONAL BLOCK DIAGRAM

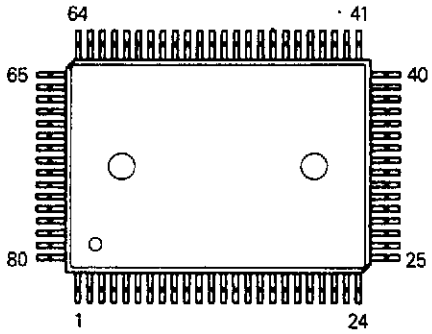
CXA1082BS : IC107

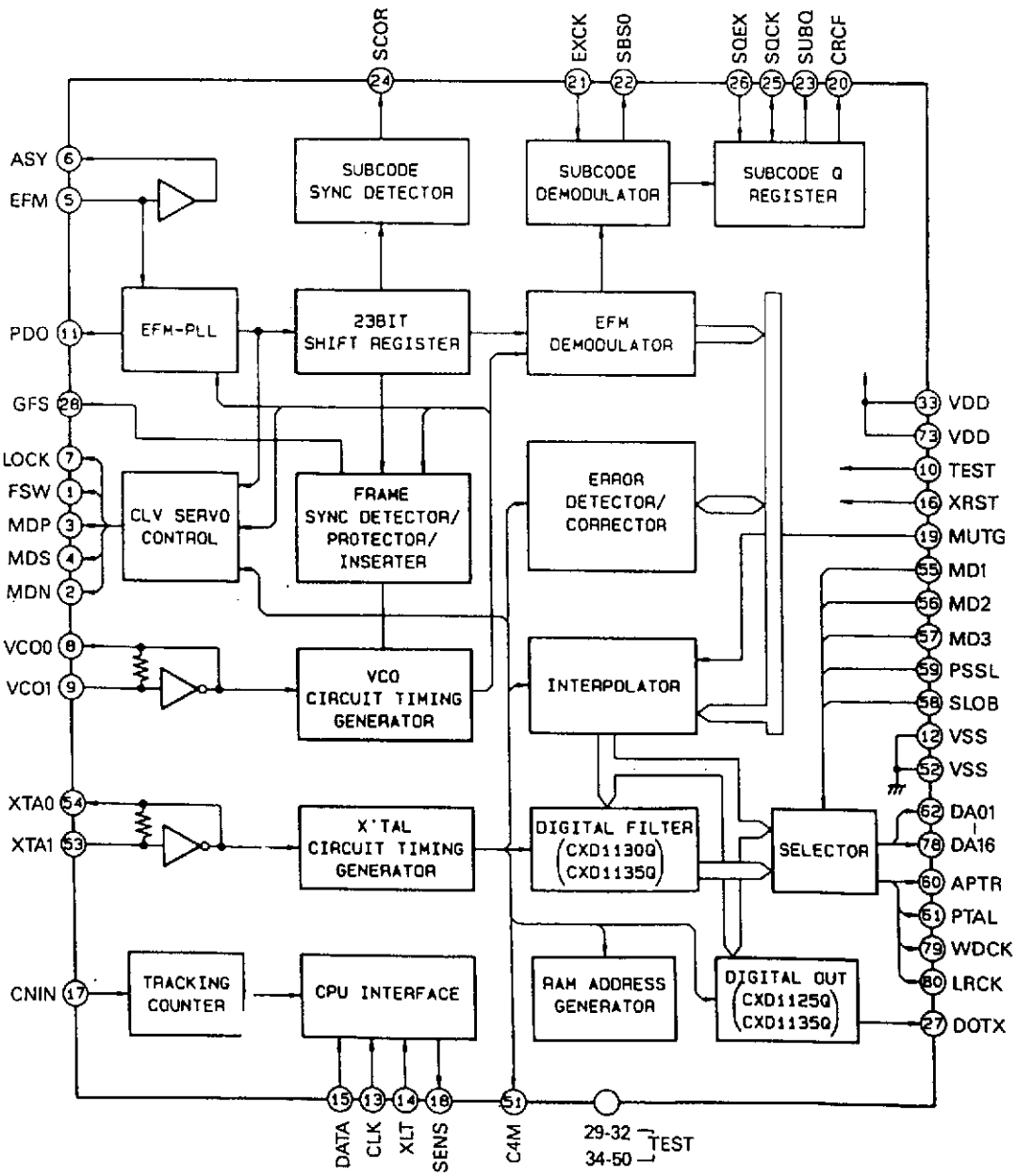


Servo Signal Processor

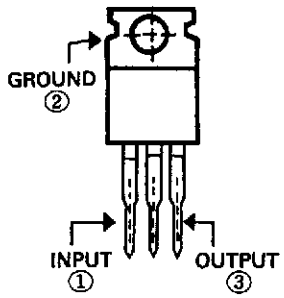


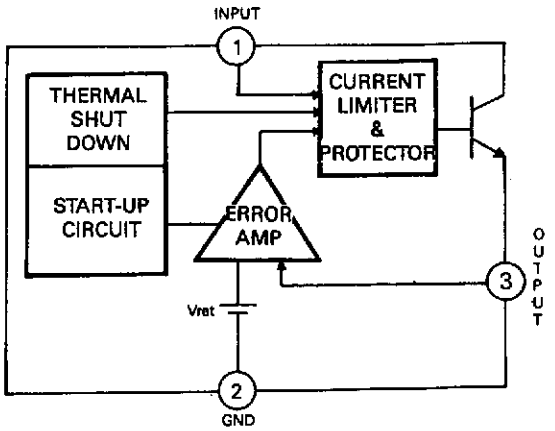
CXD1167Q : IC105 (Digital Signal Processor)



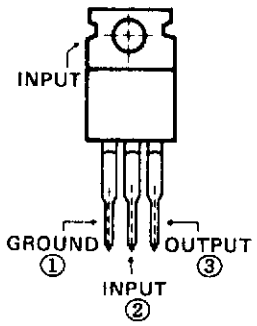


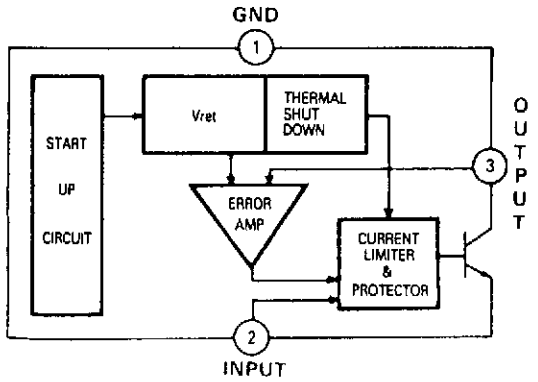
GD78XX : IC112



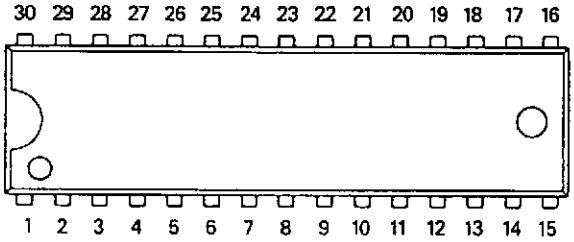


GD7915 : IC111

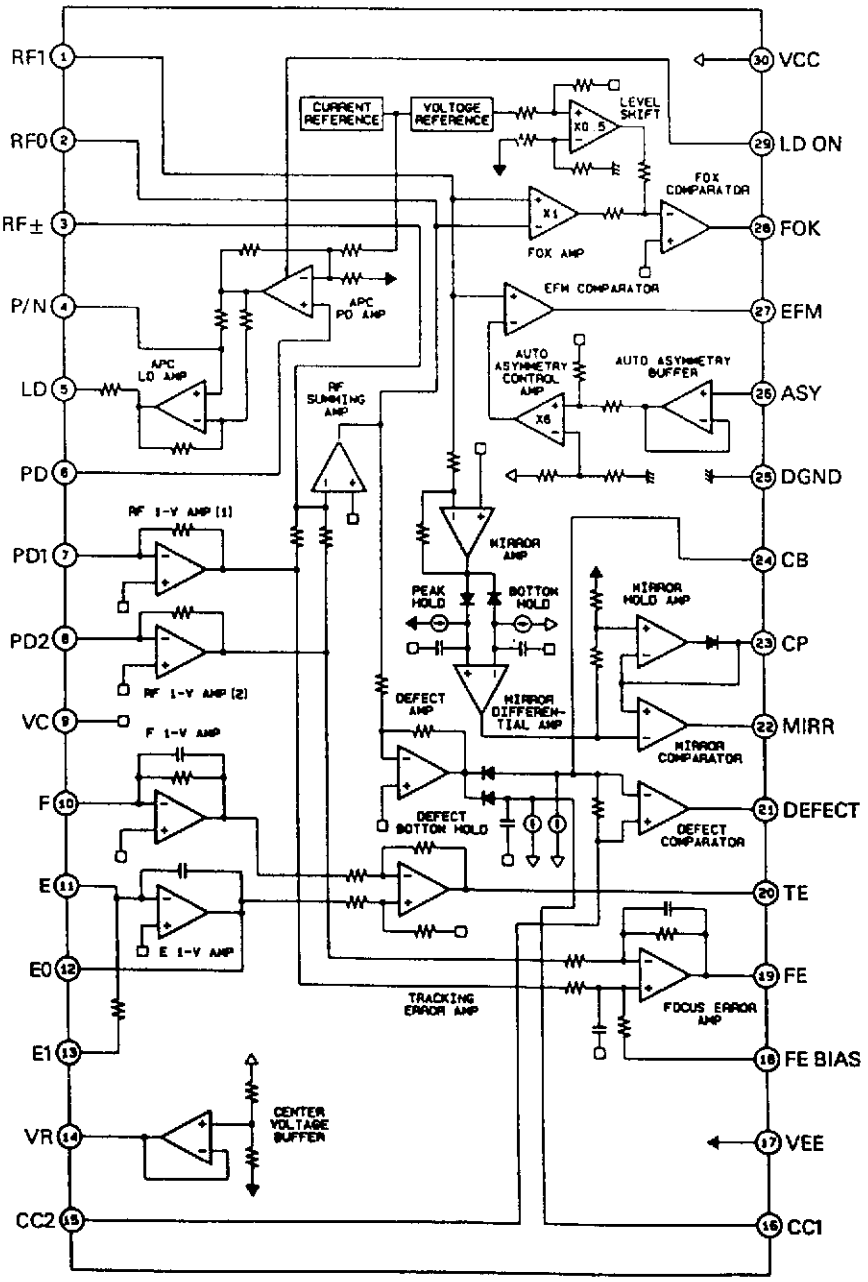




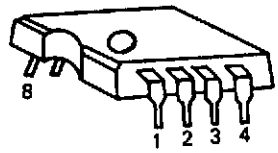
CXA1081S : IC108

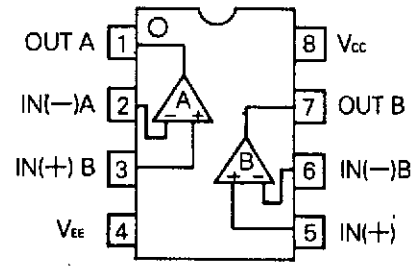


RF Amp.

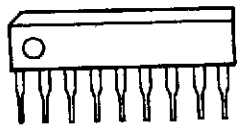


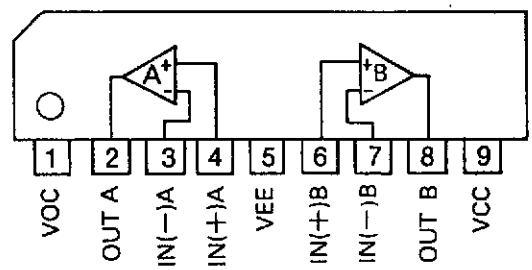
NJM4560D : IC105, IC106



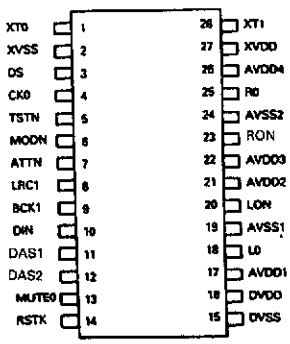


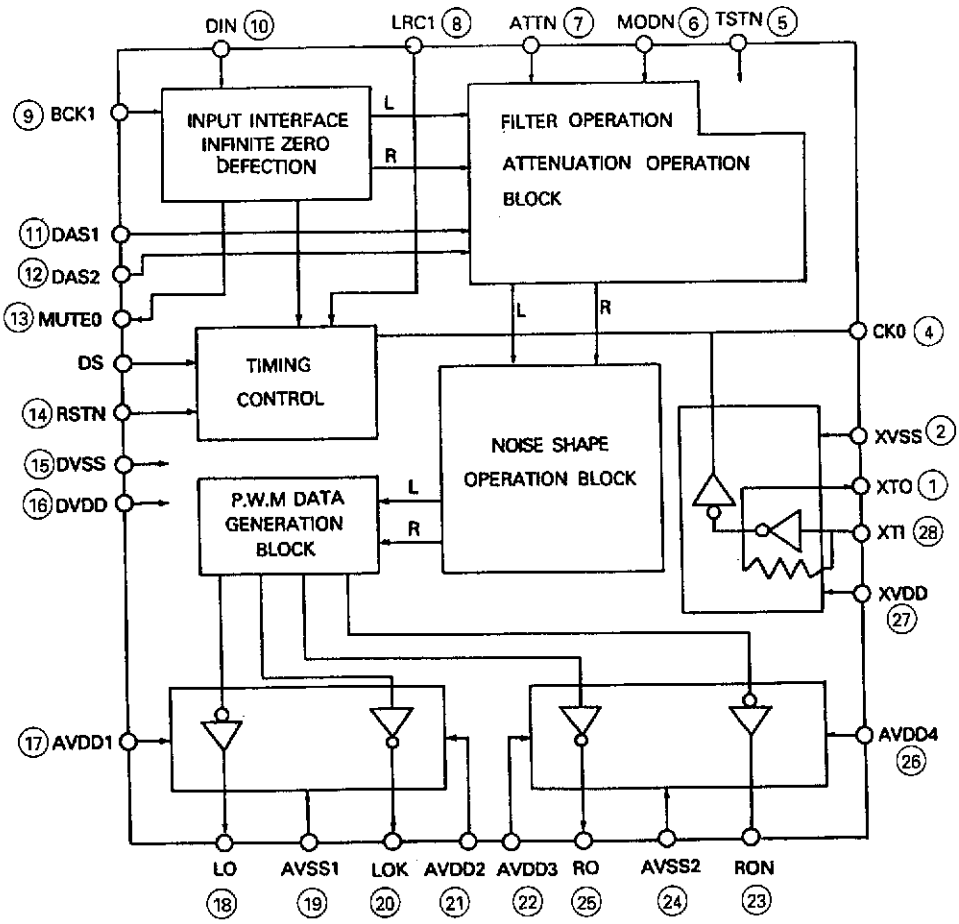
NJM4560S : IC110
KIA4559S : IC108, IC109



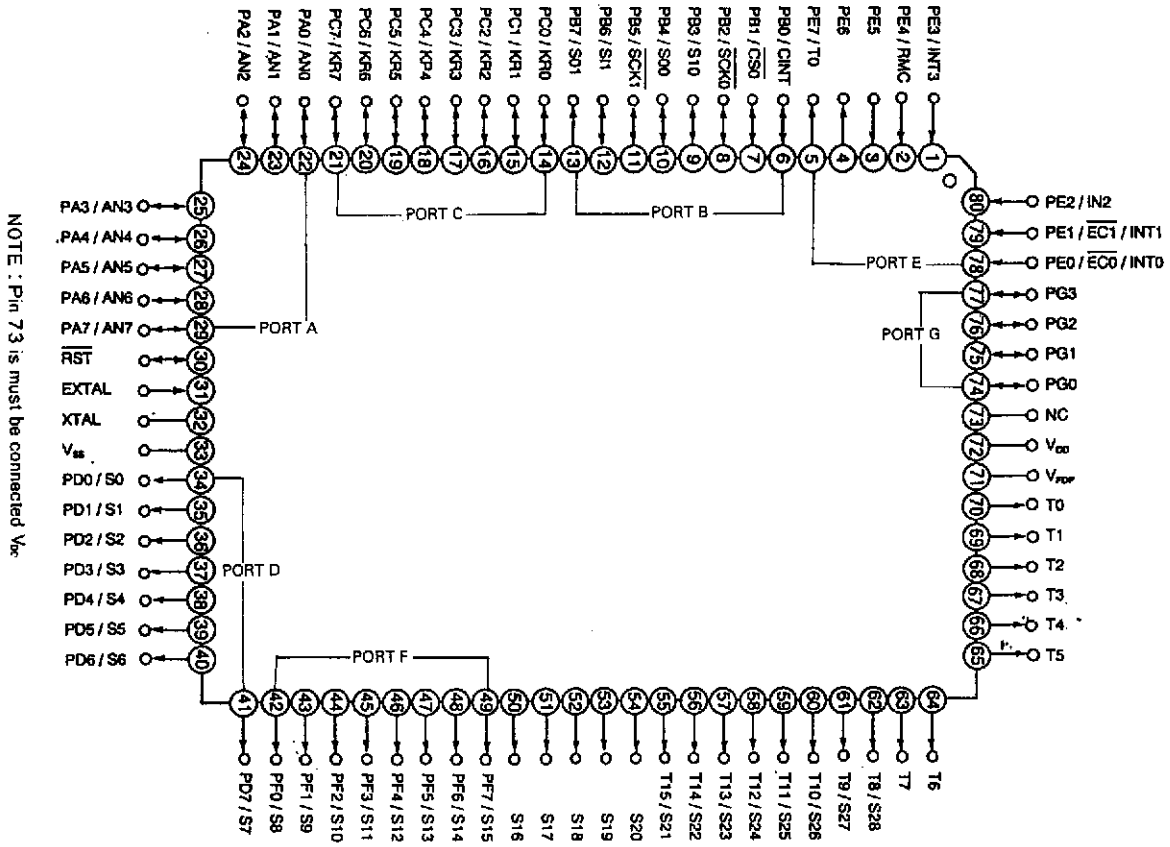


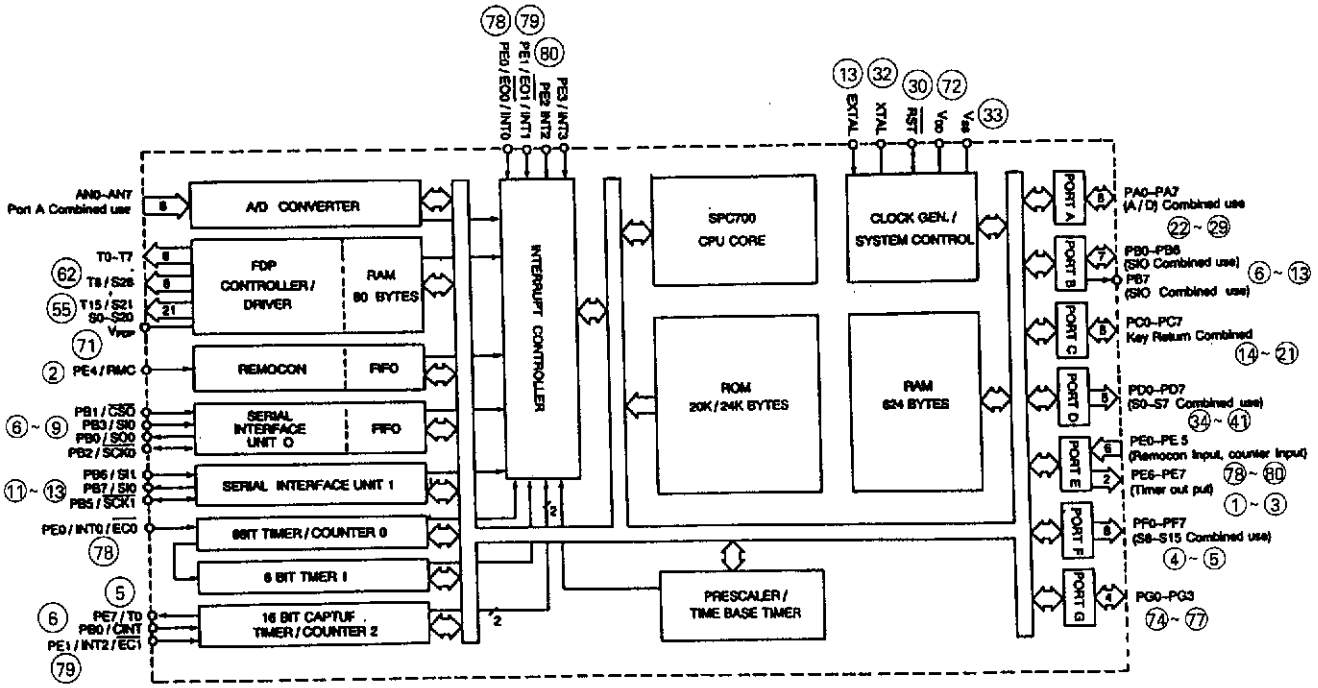
SM5871AN : IC107



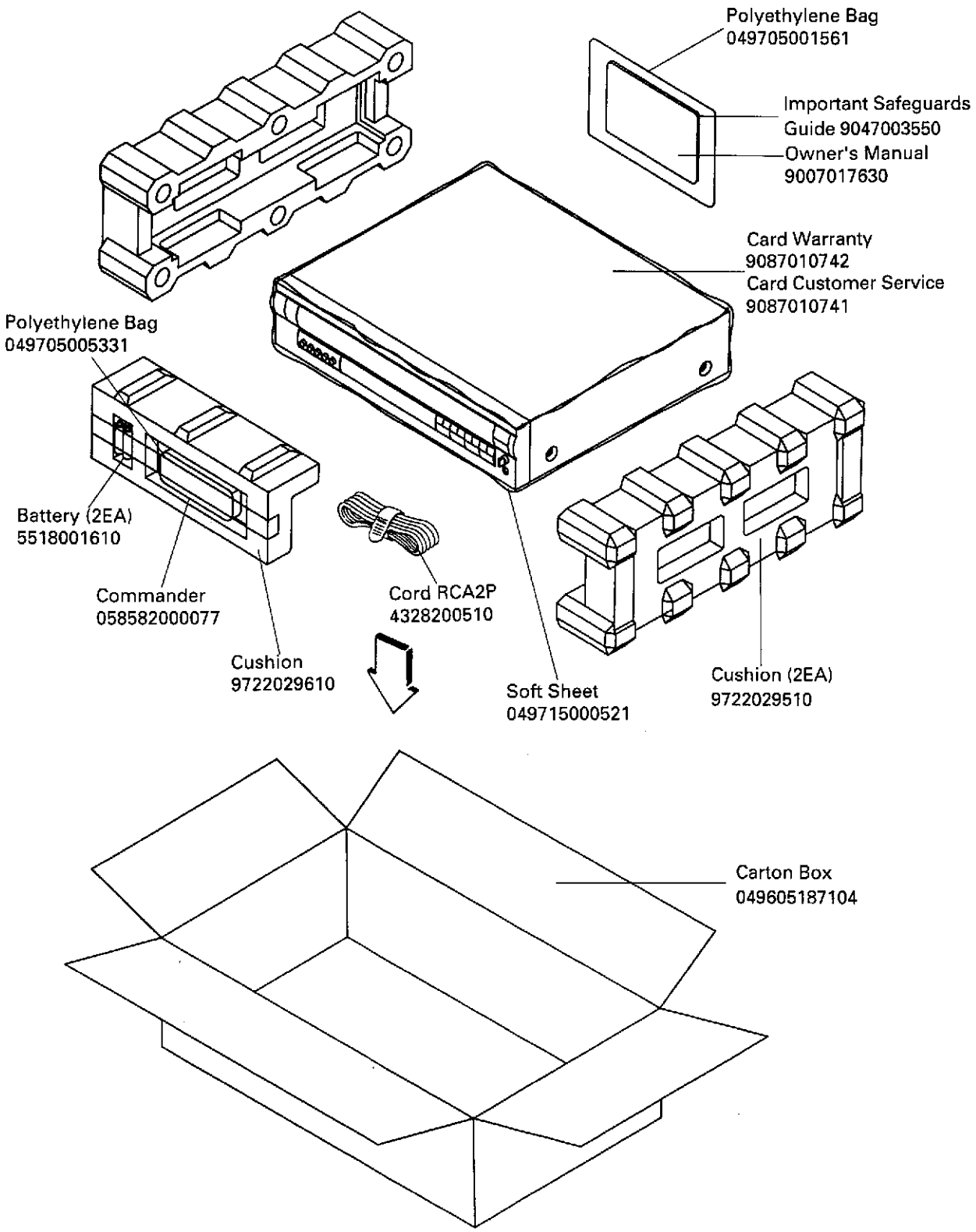


DWP 311, CXP 82316 CPU : IC102 (BLOCK DIAGRAM)

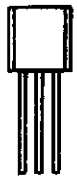
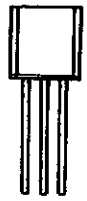
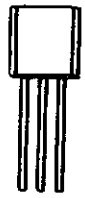
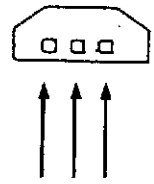


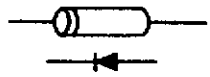
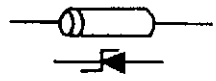


PACKAGE


Polyethylene Bag
049705001561
Important Safeguards
Guide 9047003550
Owner's Manual
9007017630
Card Warranty
9087010742
Card Customer Service
9087010741
Polyethylene Bag
049705005331
Battery (2EA)
5518001610
Commander
058582000077
Cushion
9722029610
Cord RCA2P
4328200510
Soft Sheet
049715000521
Cushion (2EA)
9722029510
Carton Box
049605187104

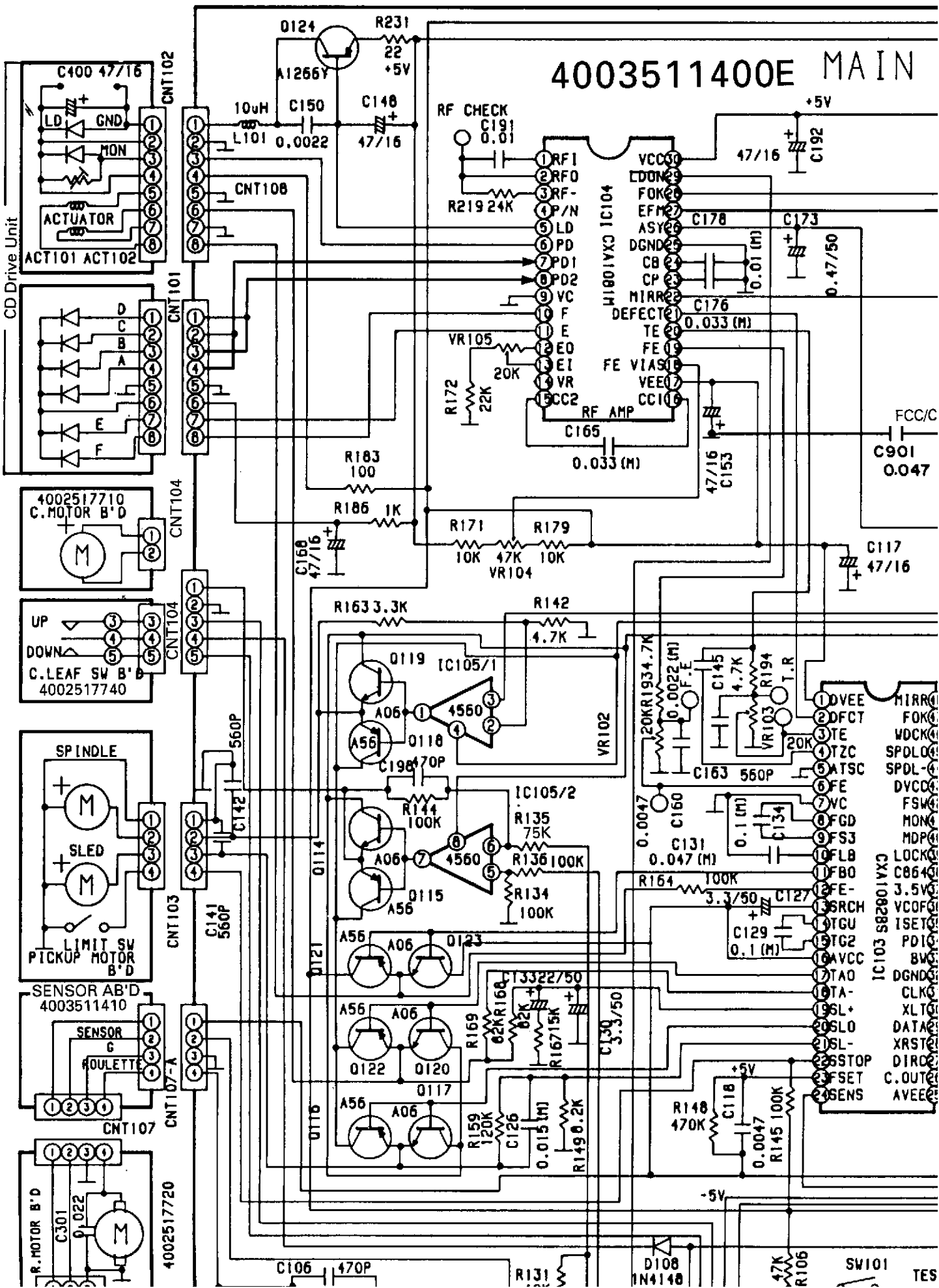
TRANSISTOR AND DIODE LEAD IDENTIFICATION

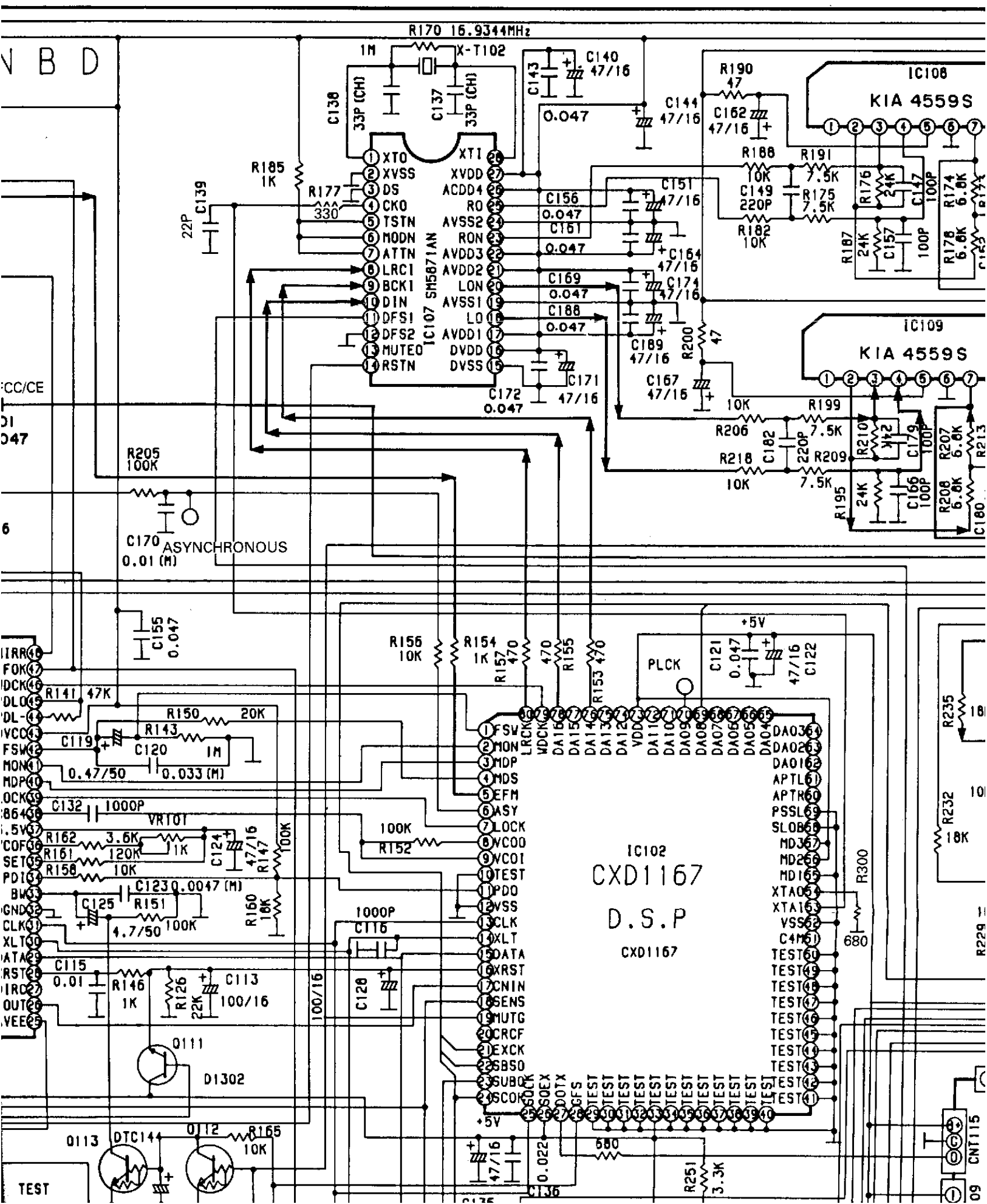
TRANSISTOR	FRONT VIEW	BOTTOM VIEW
KTC 1815Y/KTC 3198Y KTA 1015Y/KTA 1266Y KTA 1302B 2SD 1302S	 ECB	 ECB
MPSA 06 MPSA56	 EBC	 EBC
DTA 114YS/KRA 107M	 ECB	 ECB

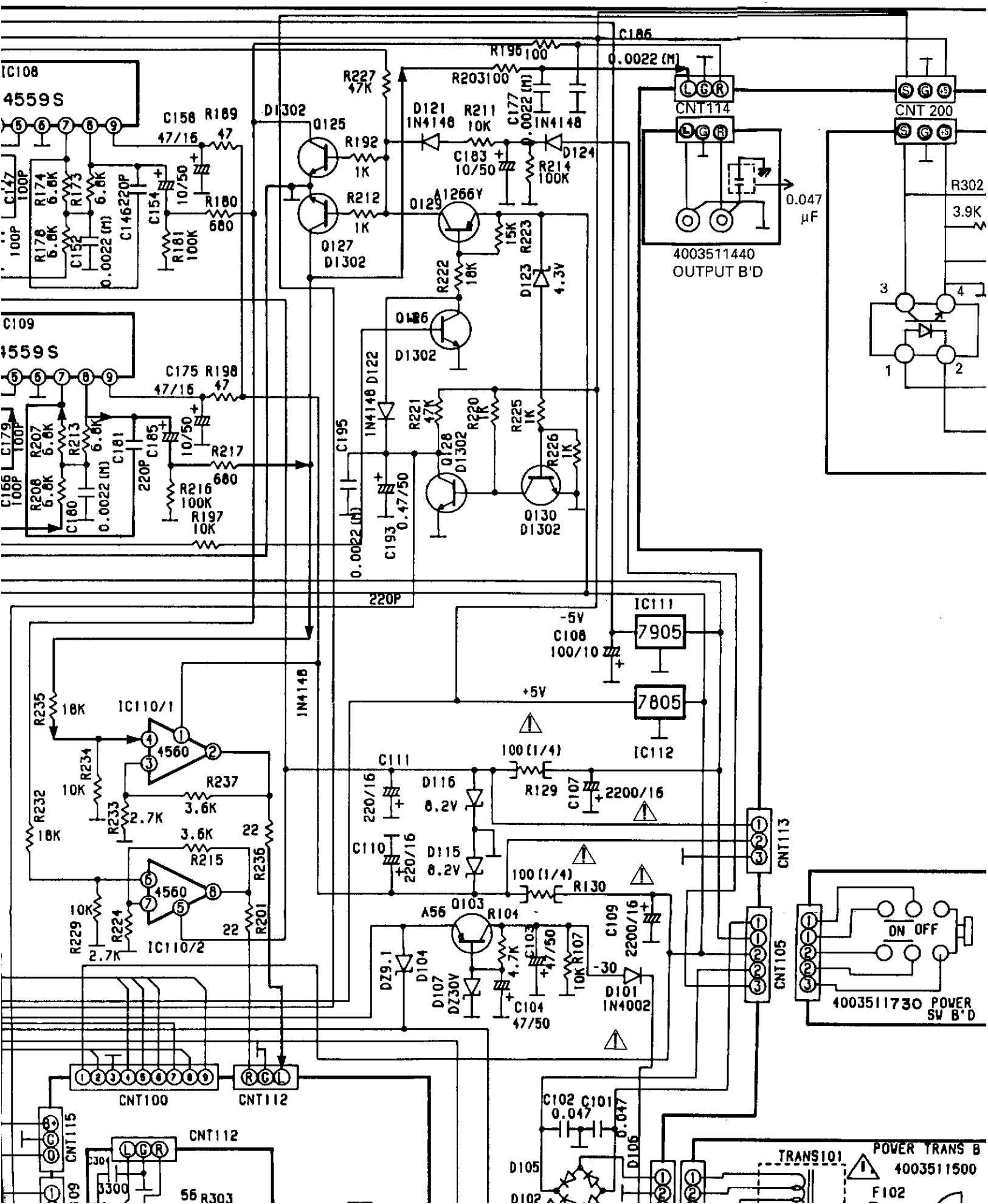
DIODE	PACKAGE VIEW
1N 4148 1N 4002	
UN XX. XBSX	

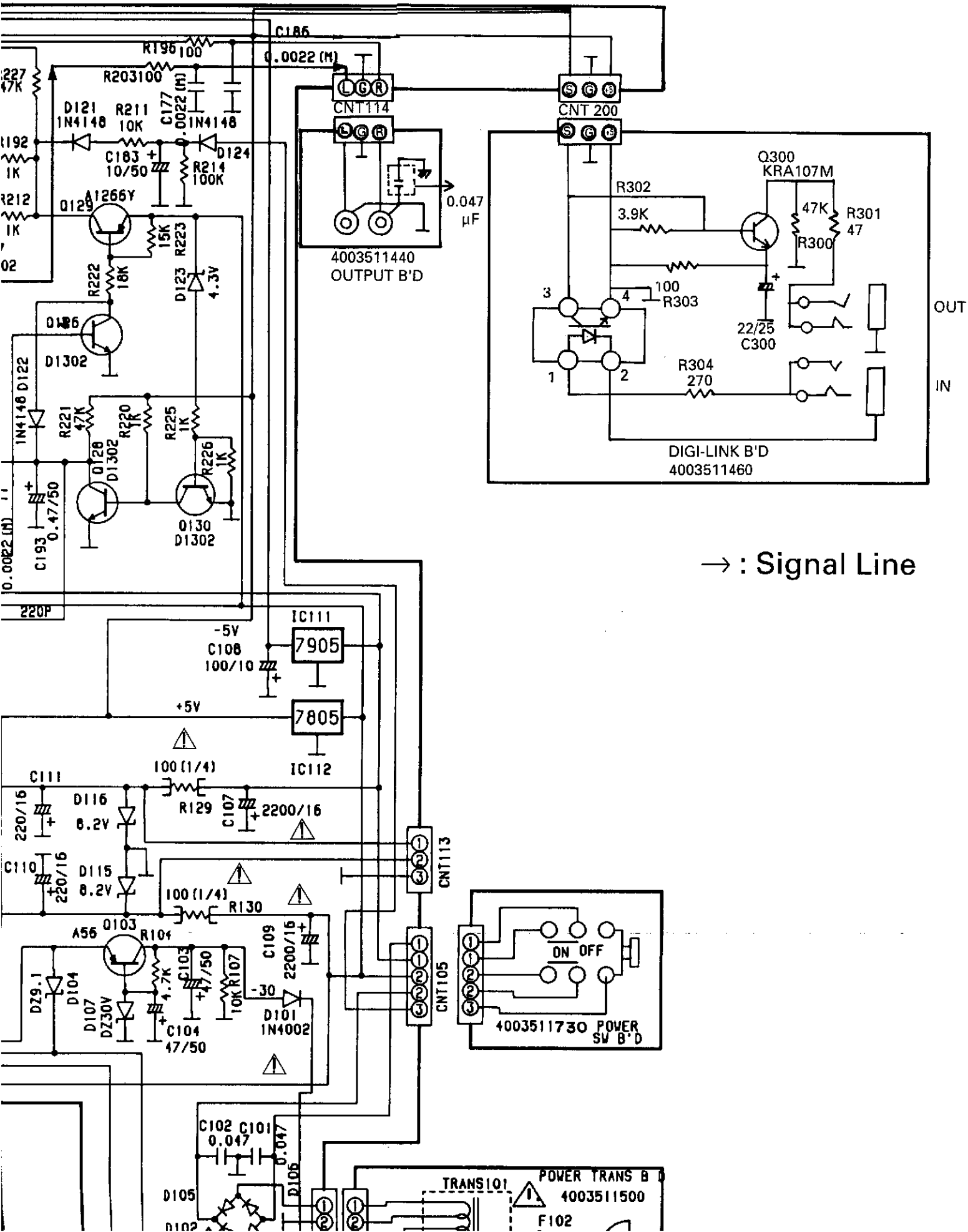
TERMINAL NAME
B : BASE C : COLLECTOR E : EMITTER

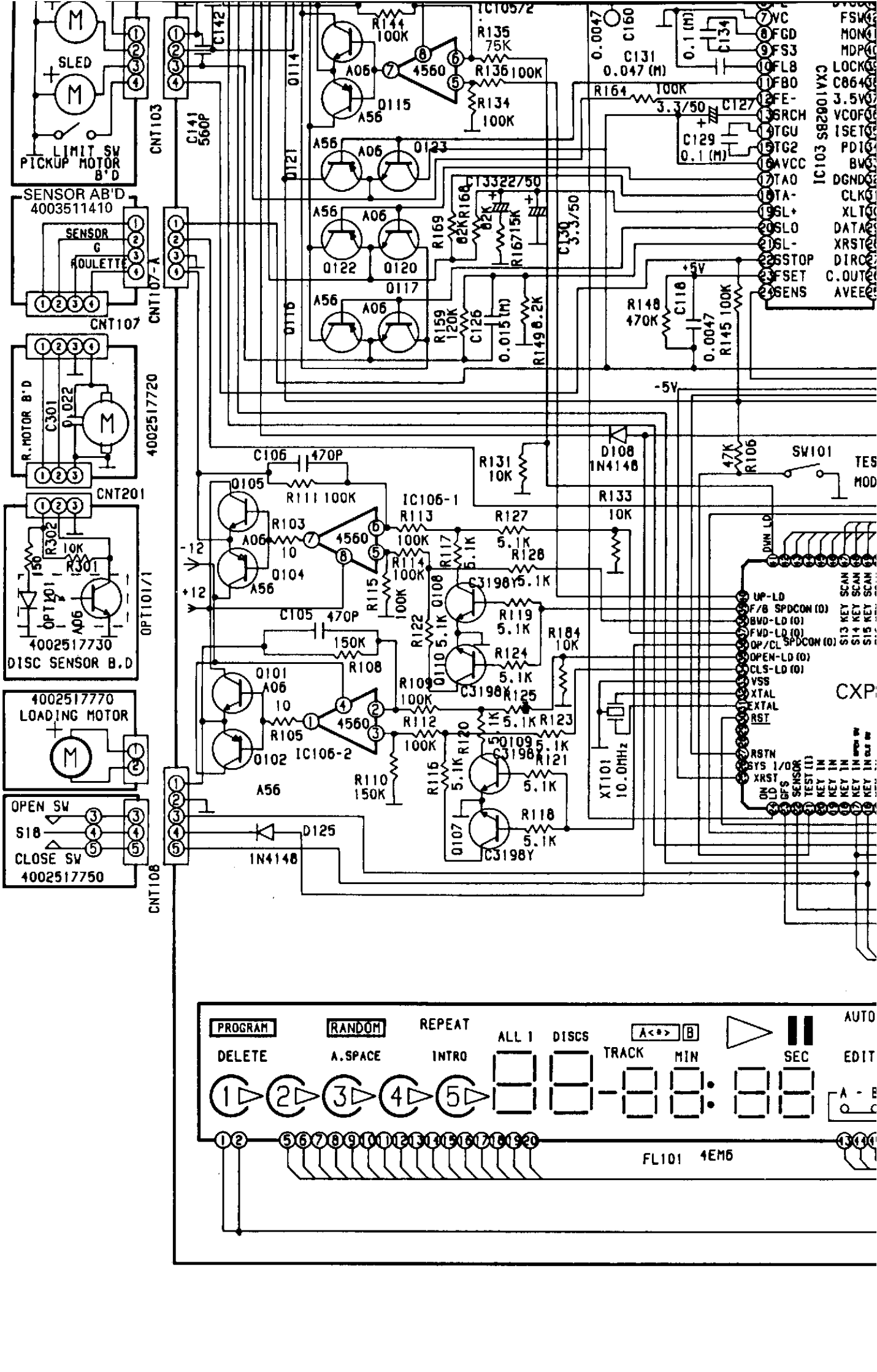
SCHEMATIC DIAGRAM

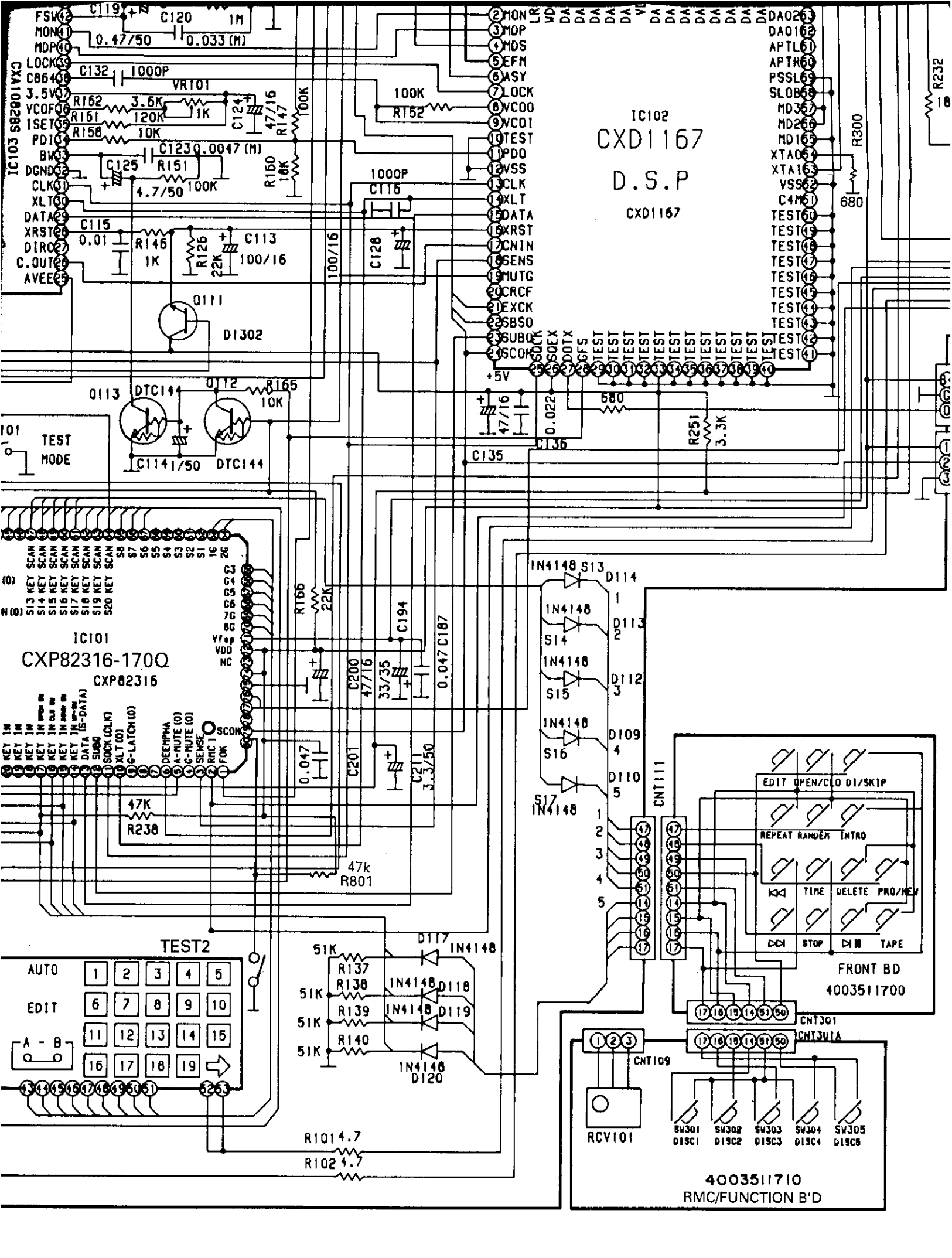


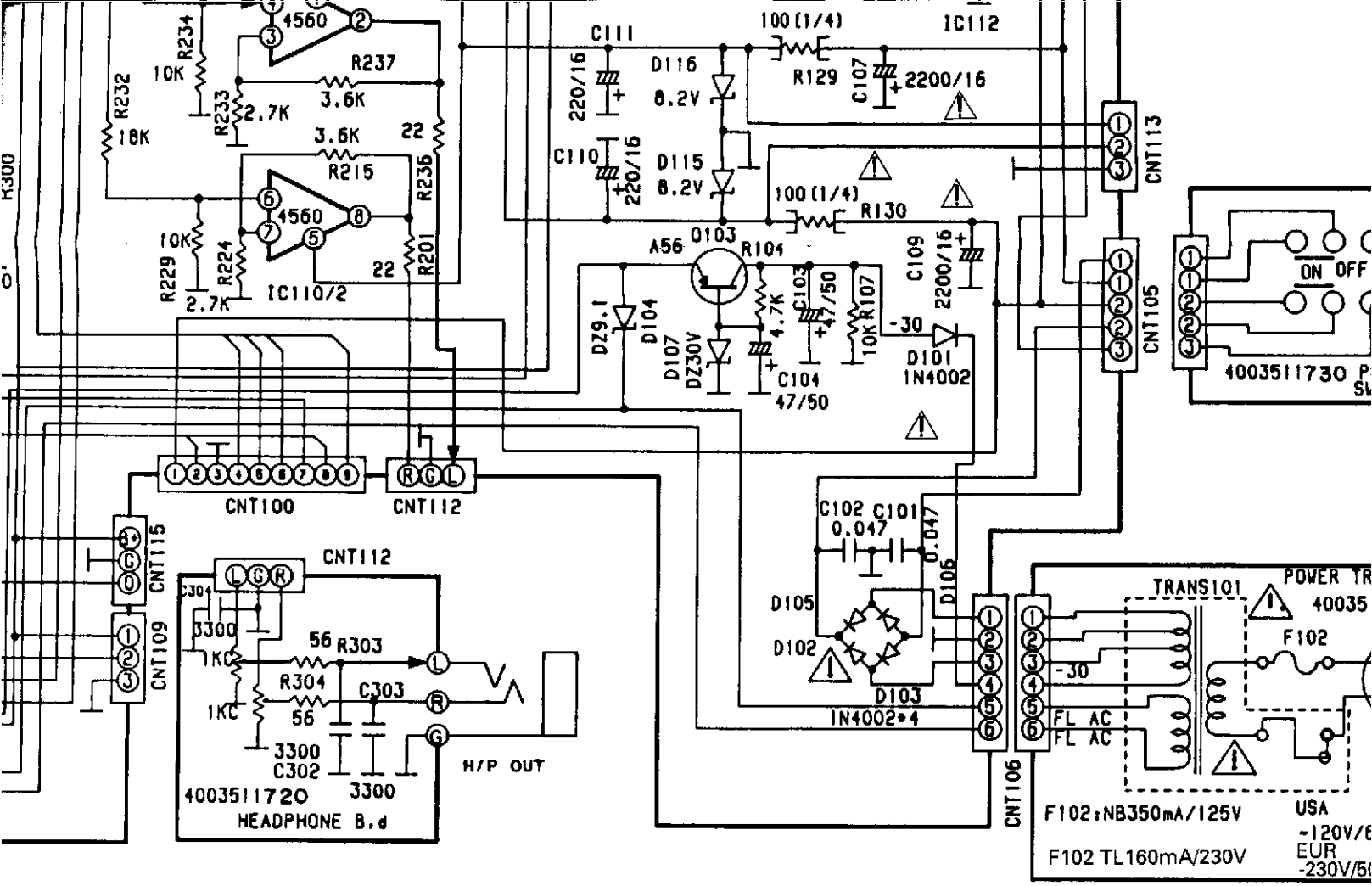

R170 16.9344MHz
X-T102
1M
C138 33P (CH)
C137 33P (CH)
C143
C140 47/16
0.047
C144 47/16
R190 47
C162 47/16
IC108
KIA 4559S
R188 10K
R191 7.5K
C149 220P
R175 7.5K
R176 24K
C147 100P
R174 6.8K
R187 24K
C157 100P
R178 6.8K
R185 1K
R177 330
C139 22P
IC107 SM5871AN
XTO XTI
XVSS XVDD
DS ACDD4
CKO RO
TSTN AVSS2
MODN RON
ATTN AVDD3
LRCI AVDD2
BCKI LON
DIN AVSS1
DFSI LO
DFS2 AVDD1
MUTEO DVDD
RSTN DVSS
C156 0.047
C151 47/16
C161 0.047
C164 47/16
C169 0.047
C174 47/16
C188 0.047
C189 47/16
C171 47/16
C172 0.047
R200 47
C167 47/16
IC109
KIA 4559S
R206 10K
R199 7.5K
C182 220P
R210 24K
C179 100P
R218 10K
R209 7.5K
R208 6.8K
C166 100P
R195 24K
R205 100K
C170 0.01 (M)
ASYNCHRONOUS
C155 0.047
R156 10K
R154 1K
R157 470
470
R155
R153 470
PLCK
C121 0.047
+5V
47/16
C122
R141 47K
R150 20K
R143
C119
C120 1M
0.47/50
0.033 (M)
C132 1000P
VR101
R162 3.6K
1K
R161 120K
R158 10K
C124 47/16
R147 100K
C123 0.0047 (M)
C125
R151 4.7/50 100K
R160 18K
100K
R152
1000P
C116
C115 0.01
R146 1K
R126 22K
C113 100/16
C128
100/16
IC102
CXD1167
D.S.P
CXD1167
R300
680
R235
R232 18K
Q111
D1302
Q113 DTC144
Q112
R165 10K
TEST
+5V
47/16
0.022
560
C136
R251 3.3K
CNT115

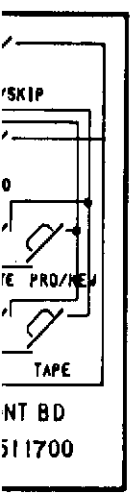

IC108
4559S
C158 R189
47/16 47
C147 100P
R174 6.8K
R173 6.8K
C146 220P
C154 10/50
R180 680
R178 6.8K
C152
0.0022 (M)
R181 100K
D1302
Q125
R192 1K
R212 1K
Q127
D1302
R227 47K
R196 100
R203 100
C186 0.0022 (M)
D121 IN4148
R211 10K
C177 .0022 (M)
IN4148
D124
C183 10/50
R214 100K
Q129 A1266Y
R222 18K
15K R223
D123 4.3V
Q126
D1302
CNT114
CNT 200
0.047 µF
4003511440
OUTPUT B'D
R302
3.9K
C109
4559S
C175 R198
47/16 47
C179 100P
R207 6.8K
R213 6.8K
C181
C185 10/50
R217 680
R208 6.8K
C180
0.0022 (M)
220P
R216 100K
R197 10K
C166 100P
C195
IN4148 D122
R221 47K
R220 1K
R225 1K
Q128 D1302
R226 1K
Q130 D1302
C193 0.47/50
0.0022 (M)
220P
IC111
-5V
C108 100/10
7905
+5V
7805
IC112
R235 18K
IC110/1
4560
R234 10K
R237 3.6K
R233 2.7K
R232 18K
3.6K
22
R215
R236
4560
R229 10K
R224 2.7K
IC110/2
22
R201
IN4148
C111 220/16
D116 6.2V
100 (1/4) R129
C107 2200/16
C110 220/16
D115 6.2V
100 (1/4) R130
A56 Q103
R104
C109 2200/16
DZ9.1 D104
D107 DZ30V
4.7K
C103 47/50
10K R107
-30
D101 IN4002
C104 47/50
CNT113
CNT105
ON OFF
4003511730 POWER SW B'D
CNT100
CNT112
CNT112
CNT115
C102 C101
0.047 0.047
D106
D105
D102
TRANS101
POWER TRANS B
4003511500
F102
3300
56 R303


C186
0.0022 (M)
R196 100
R203 100
D121 1N4148
R211 10K
C177 0.0022 (M)
D124 1N4148
C183 10/50
R214 100K
Q129 A1266Y
R222 16K
15K R223
D123 4.3V
Q126
D1302
D122 1N4148
R221 47K
R220 1K
R225 1K
R226 1K
Q128 D1302
Q130 D1302
C193 0.47/50
220P
CNT114
CNT 200
4003511440
OUTPUT B'D
0.047 μF
Q300 KRA107M
R302
3.9K
47K
R301 47
R300
100 R303
22/25 C300
R304 270
OUT
IN
DIGI-LINK B'D
4003511460
→ : Signal Line
IC111
-5V
C108 100/10
7905
+5V
7805
IC112
100 (1/4)
C111
D116 6.2V
R129
C107 2200/16
220/16
C110
D115 6.2V
100 (1/4) R130
CNT113
Q103
R104
C109 2200/16
D29.1
D104
D107 DZ30V
C103 47/50
4.7K
10K R107
-30
D101 1N4002
C104 47/50
CNT105
ON OFF
4003511730 POWER SW B'D
C102 0.047
C101 0.047
D106
D105
TRANS101
POWER TRANS B'D
4003511500
F102


SLED
LIMIT SW
PICKUP MOTOR B'D
CNT103
SENSOR AB'D
4003511410
SENSOR
G
ROULETTE
CNT107
CNT107-A
R.MOTOR B'D
4002517720
CNT201
DISC SENSOR B.D
4002517730
OPT101/1
4002517770
LOADING MOTOR
OPEN SW
S18
CLOSE SW
4002517750
CNT108
IC106-1
IC106-2
4560
A06
A56
IC103 SB2001YX3
CXP
PROGRAM
RANDOM
REPEAT
ALL 1
DISCS
TRACK
MIN
SEC
AUTO
DELETE
A.SPACE
INTRO
EDIT
FL101 4EM6


IC102
CXD1167
D.S.P
CXD1167
IC101
CXP82316-170Q
CXP82316
IC103 S8280
CXA1082S
Q111
D1302
Q113
DTC144
Q112
DTC144
R165
10K
TEST
MODE
TEST2
AUTO
EDIT
A - B
1 2 3 4 5
6 7 8 9 10
11 12 13 14 15
16 17 18 19
R238
47K
R801
47k
R166
22K
R1014.7
R1024.7
R137
R138
R139
R140
51K
D117
D118
D119
D120
IN4148
S13
S14
S15
S16
S17
D114
D113
D112
D109
D110
CNT111
EDIT OPEN/CLO DI/SKIP
REPEAT RANDOM INTRO
TIME DELETE PRO/REV
STOP TAPE
FRONT BD
4003511700
CNT301
CNT301A
CNT109
RCV101
SW301 DISC1
SW302 DISC2
SW303 DISC3
SW304 DISC4
SW305 DISC5
4003511710
RMC/FUNCTION B'D
VRT01
R162 3.6K
R161 120K
R158 10K
R151 100K
R152 100K
R147 100K
R160 10K
R146 1K
R126 22K
R251 3.3K
R300 680
R232 18
C119
C120 1M
C132 1000P
C124 47/16
C125
C123 0.0047 (M)
C115 0.01
C113 100/16
C116 1000P
C128 100/16
C136 0.022
C135
C114 1/50
C194
C200 47/16
C201
C211 3.3/50
0.047 C187
+5V





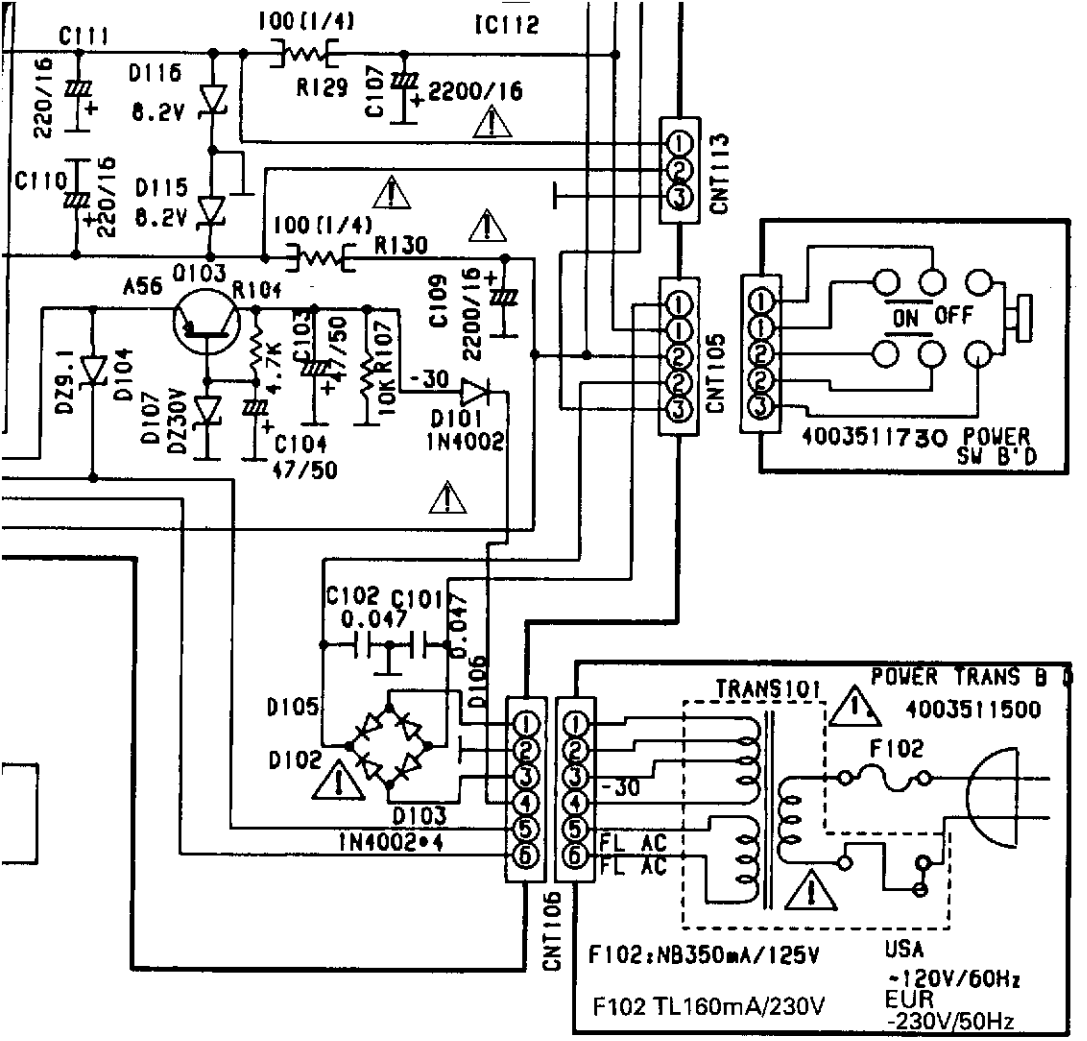
NOTES

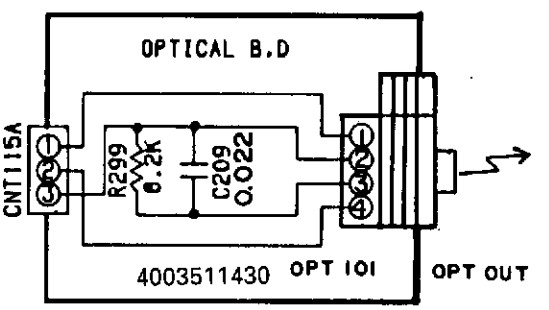
1. Resistor values are indicated in ohms unless otherwise specified
   [k=1,000 M=1,000,000]
2. Capacitor values are indicated in microfarades unless otherwise specified.
   [P=micro-microfarades]

CAUTION

Safety precaution to be followed during servicing

1) Since those parts maked with ⚠ are critical parts for safety use only the one described in the parts list.
2) Before returning the set to customer the make appropriate leakage current or resistance measurements to determine the exposed pparts are properly insulated from the supply circuit.





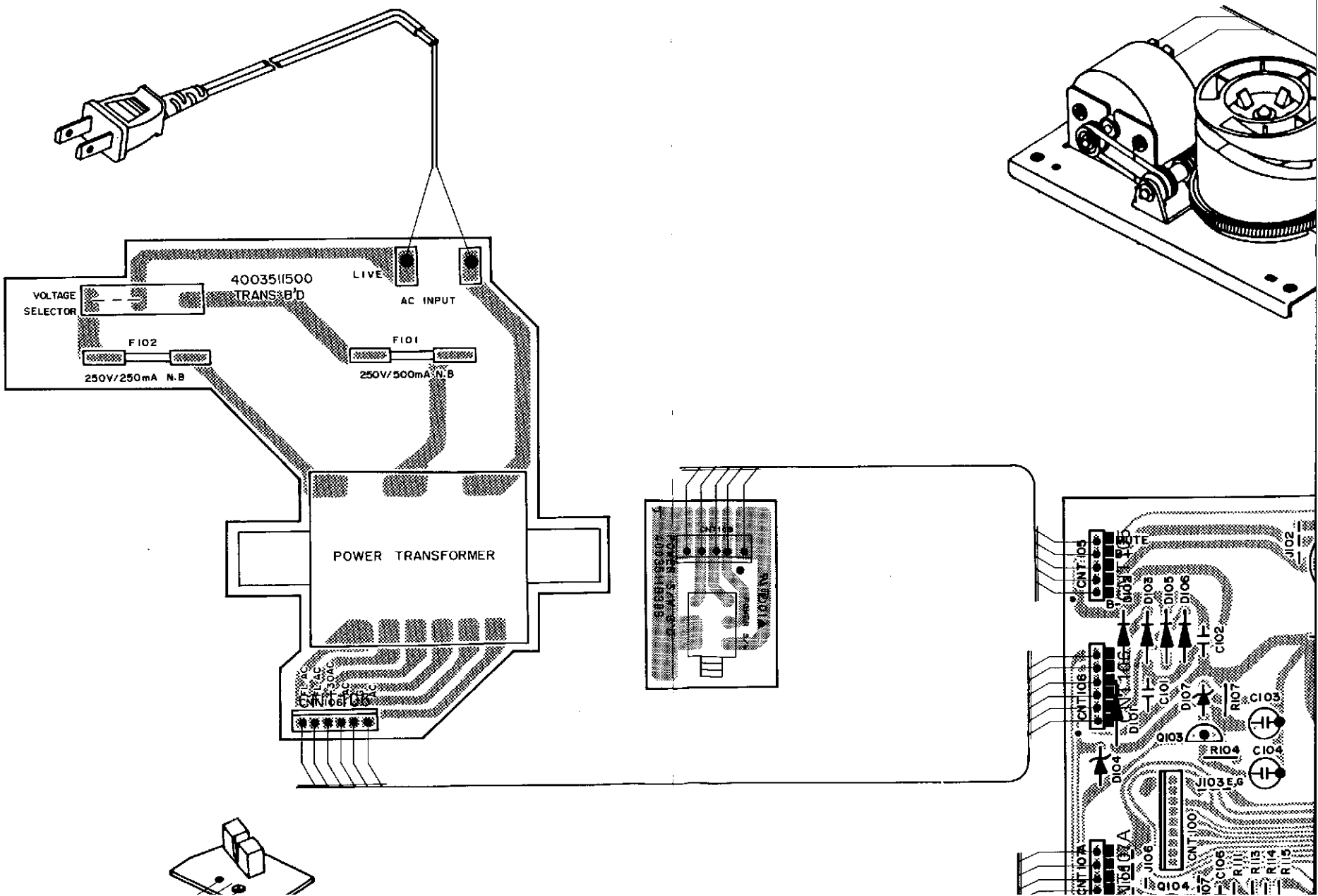
licated in ohms unless

M=1,000,000]
idicated in microfarades
fied.
icrofarades]

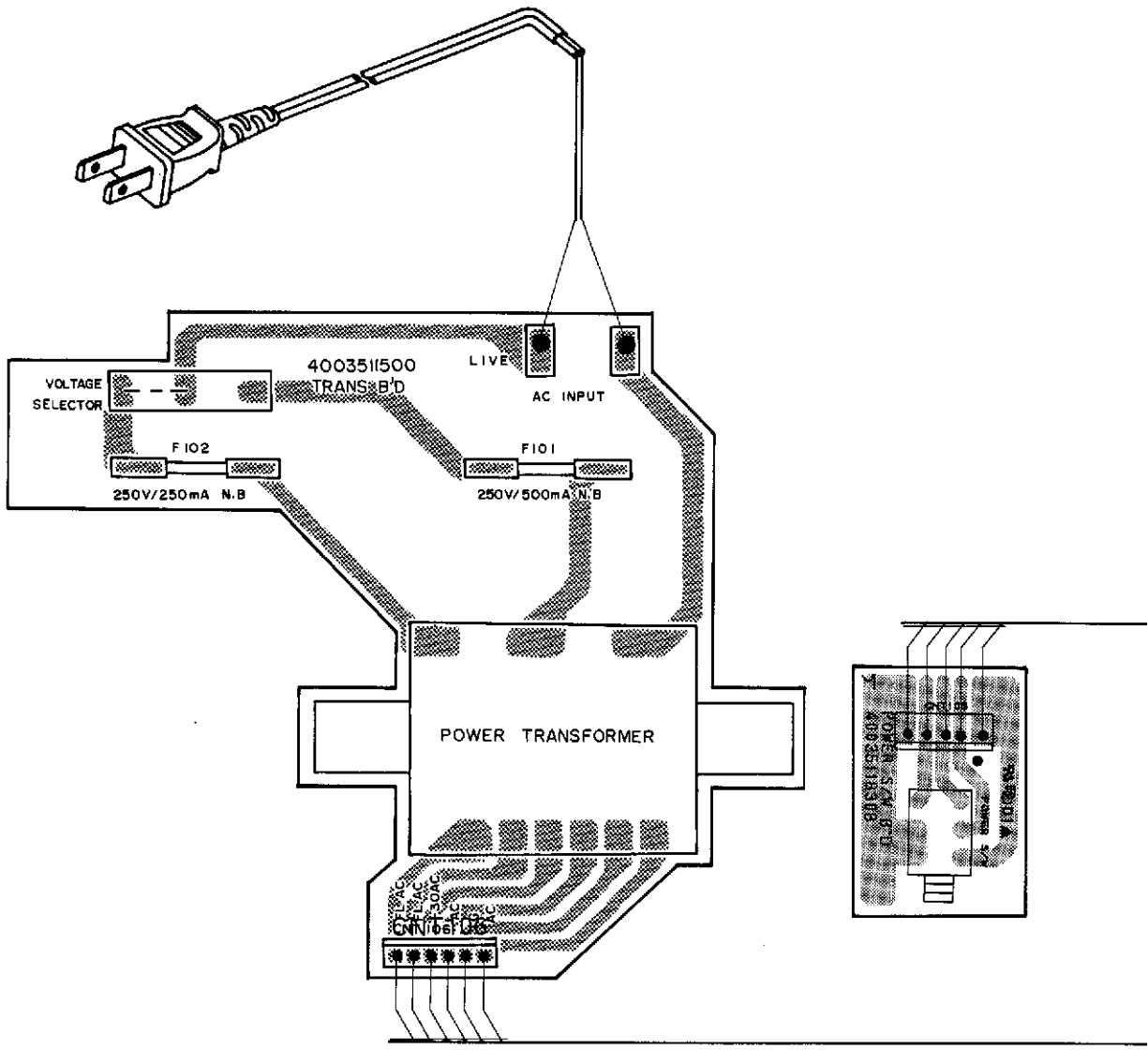
ollowed during servicing
ed with ⚠ are critical
ly the one described in

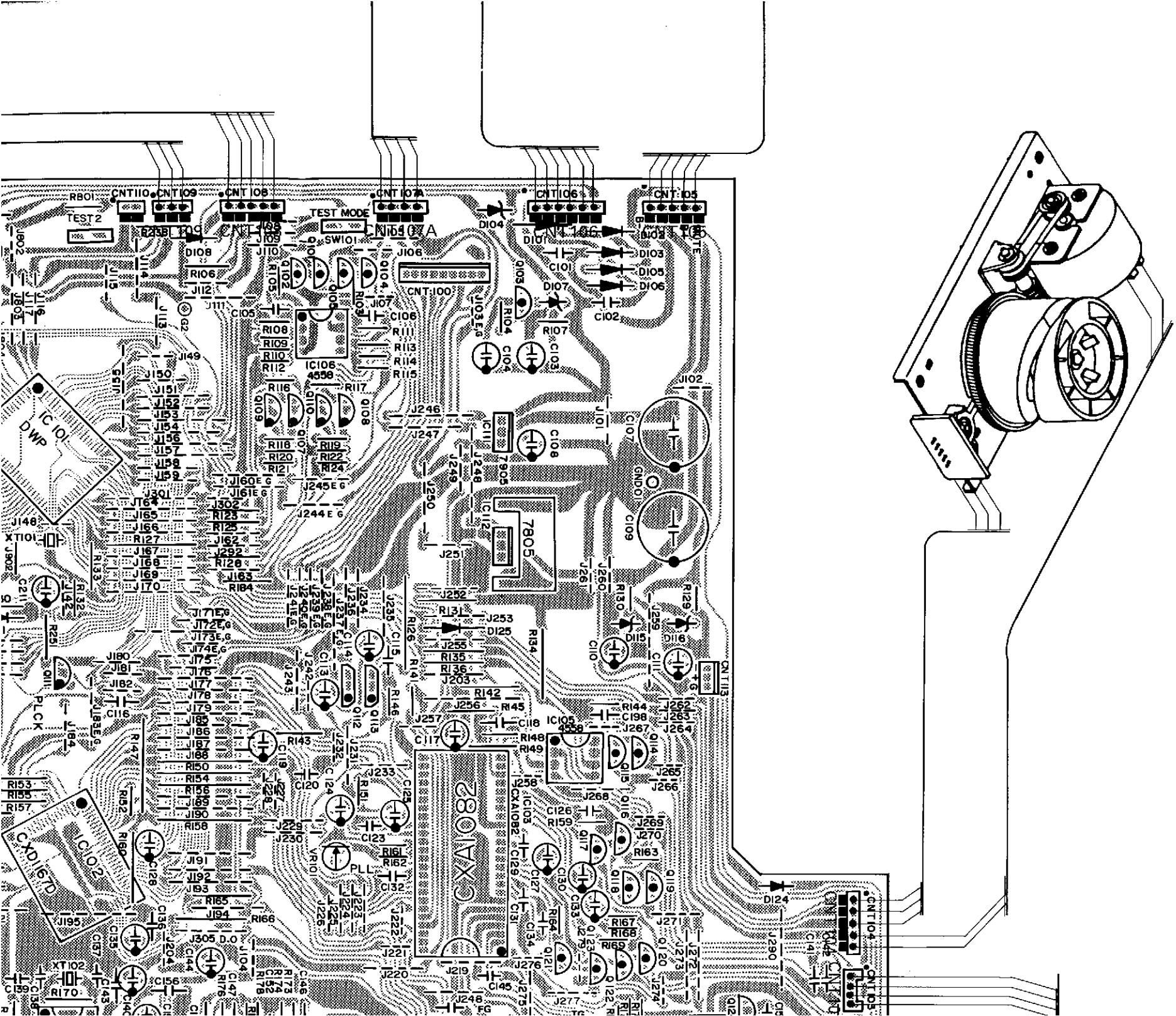
et to customer the make
rrent or resistance
rmine the exposed pparts
from the supply circuit.

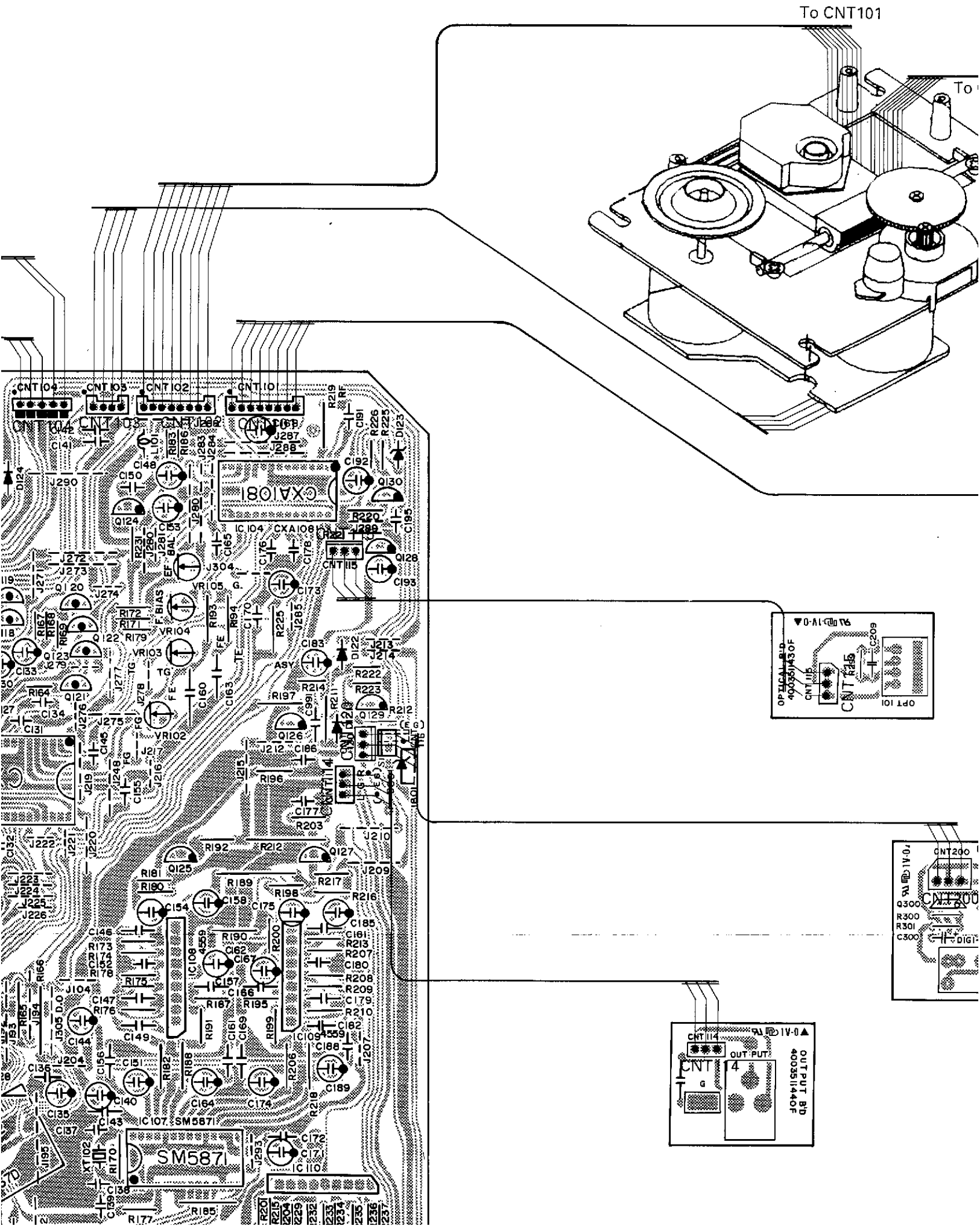
/IRING DIAGRAM

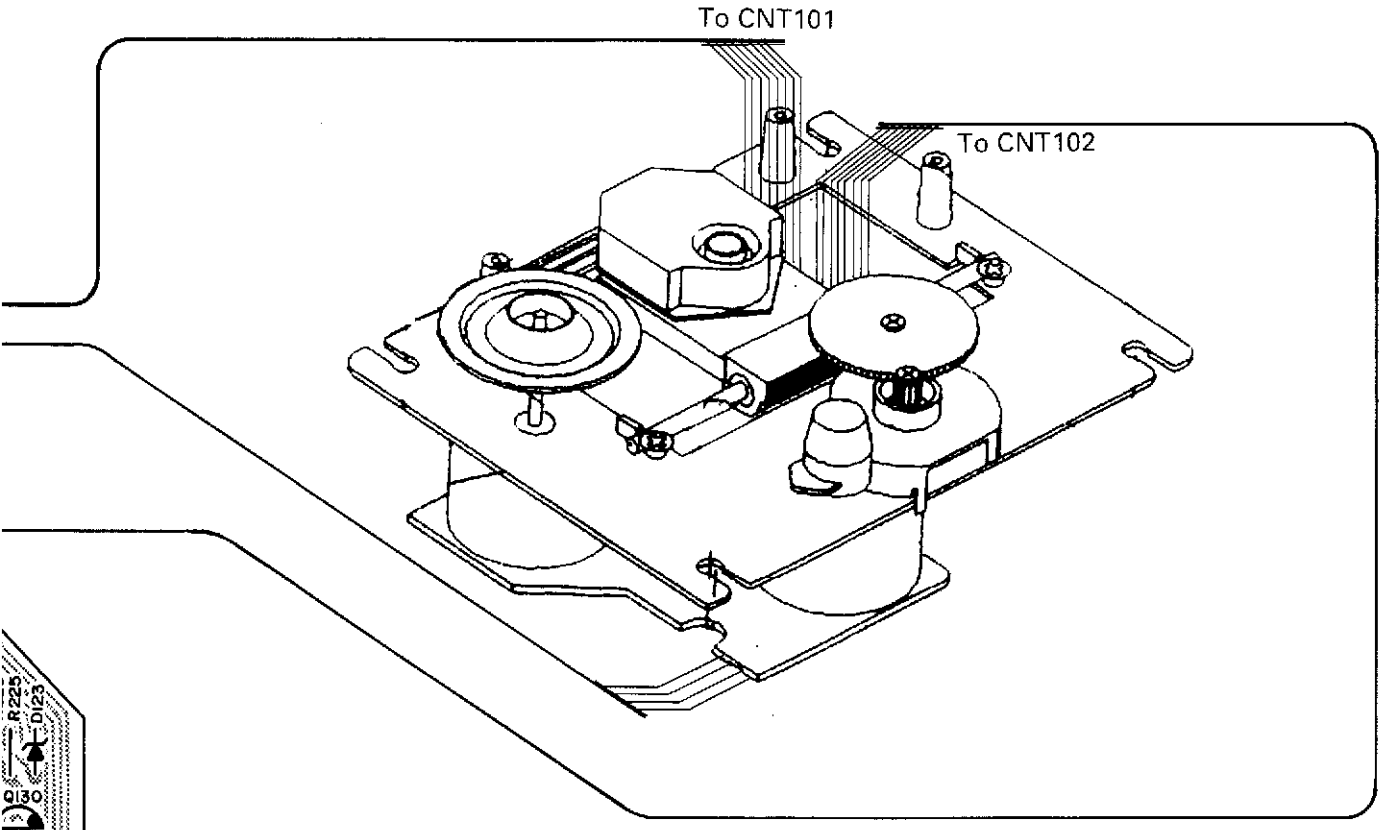


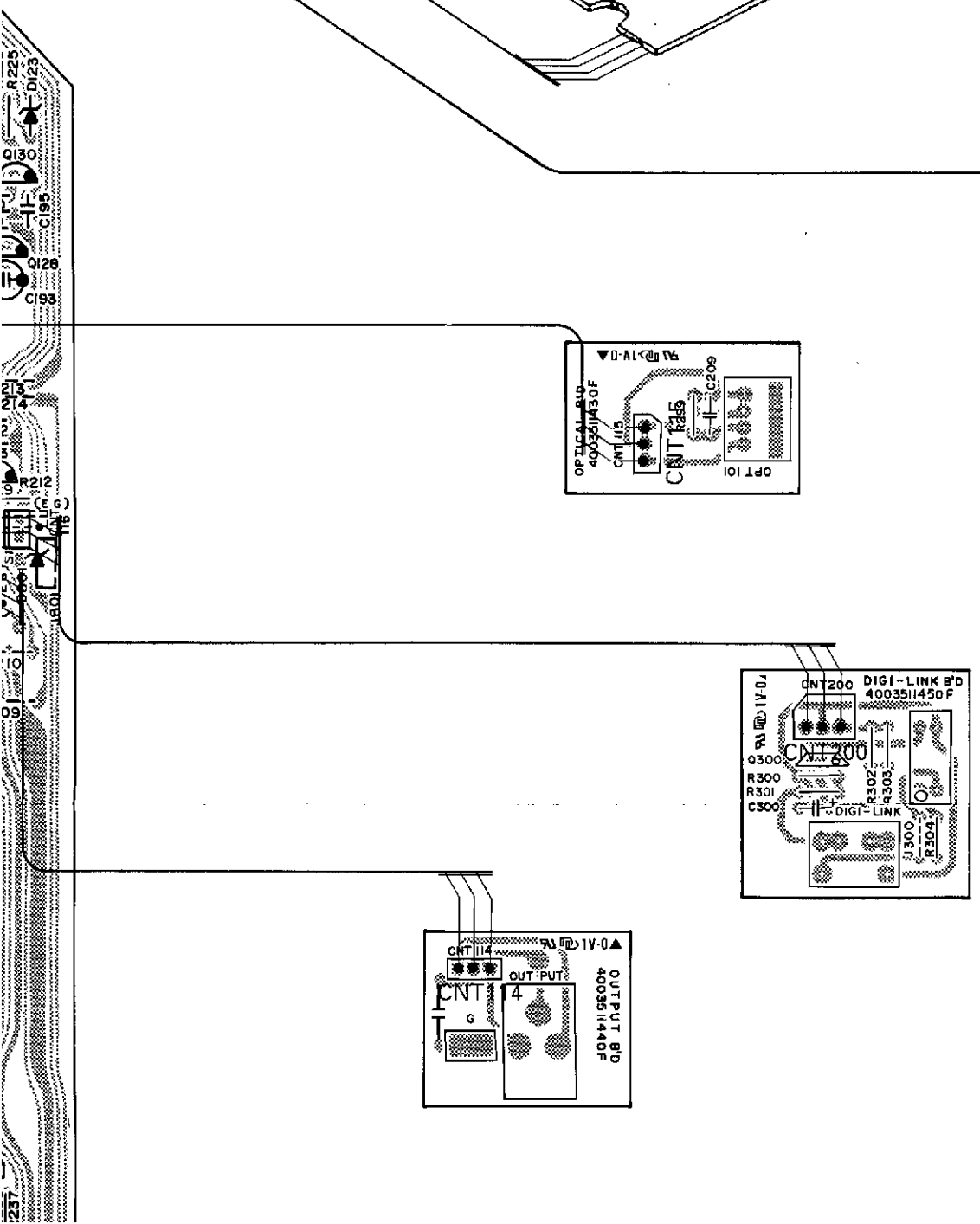
WIRING DIAGRAM

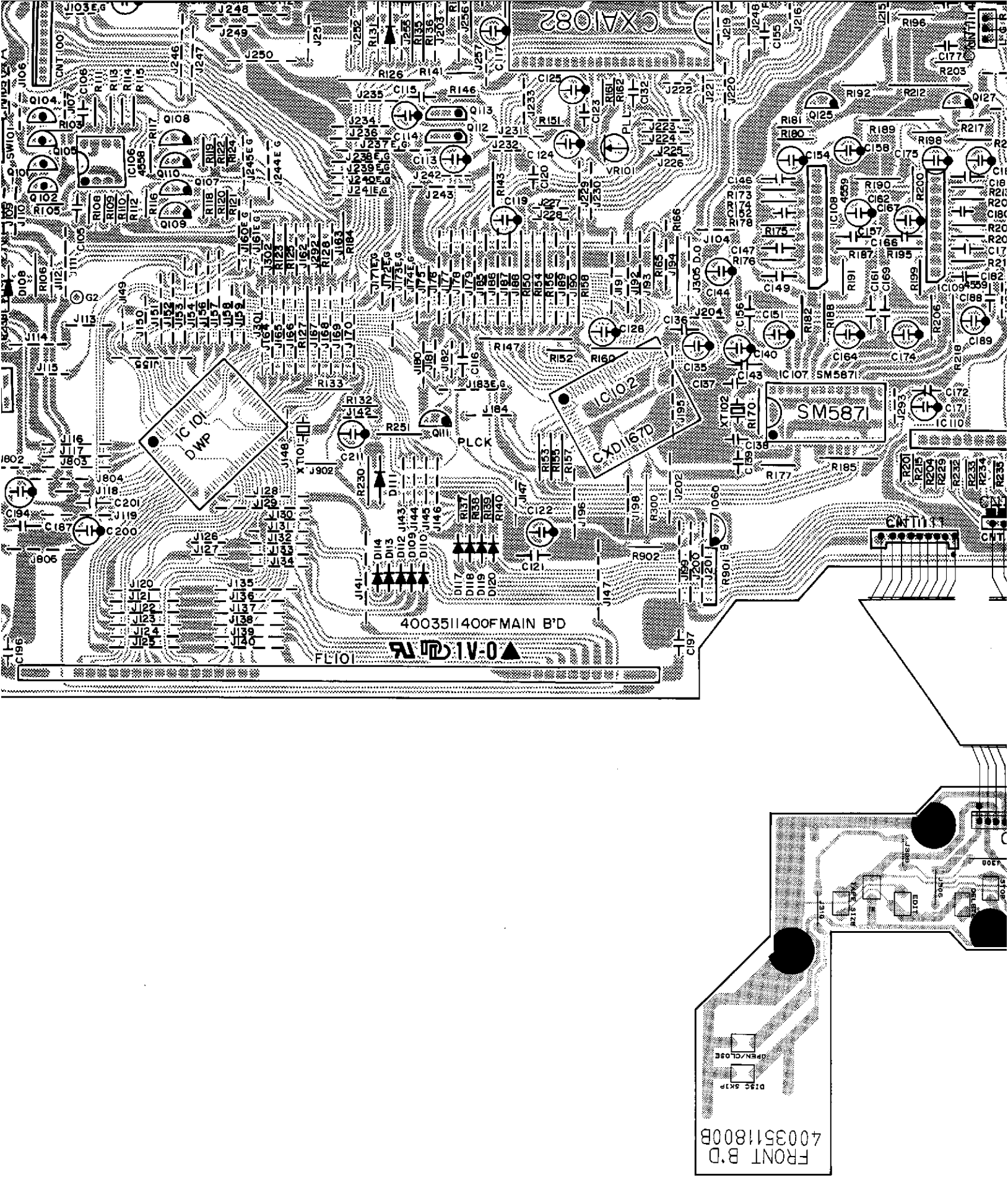


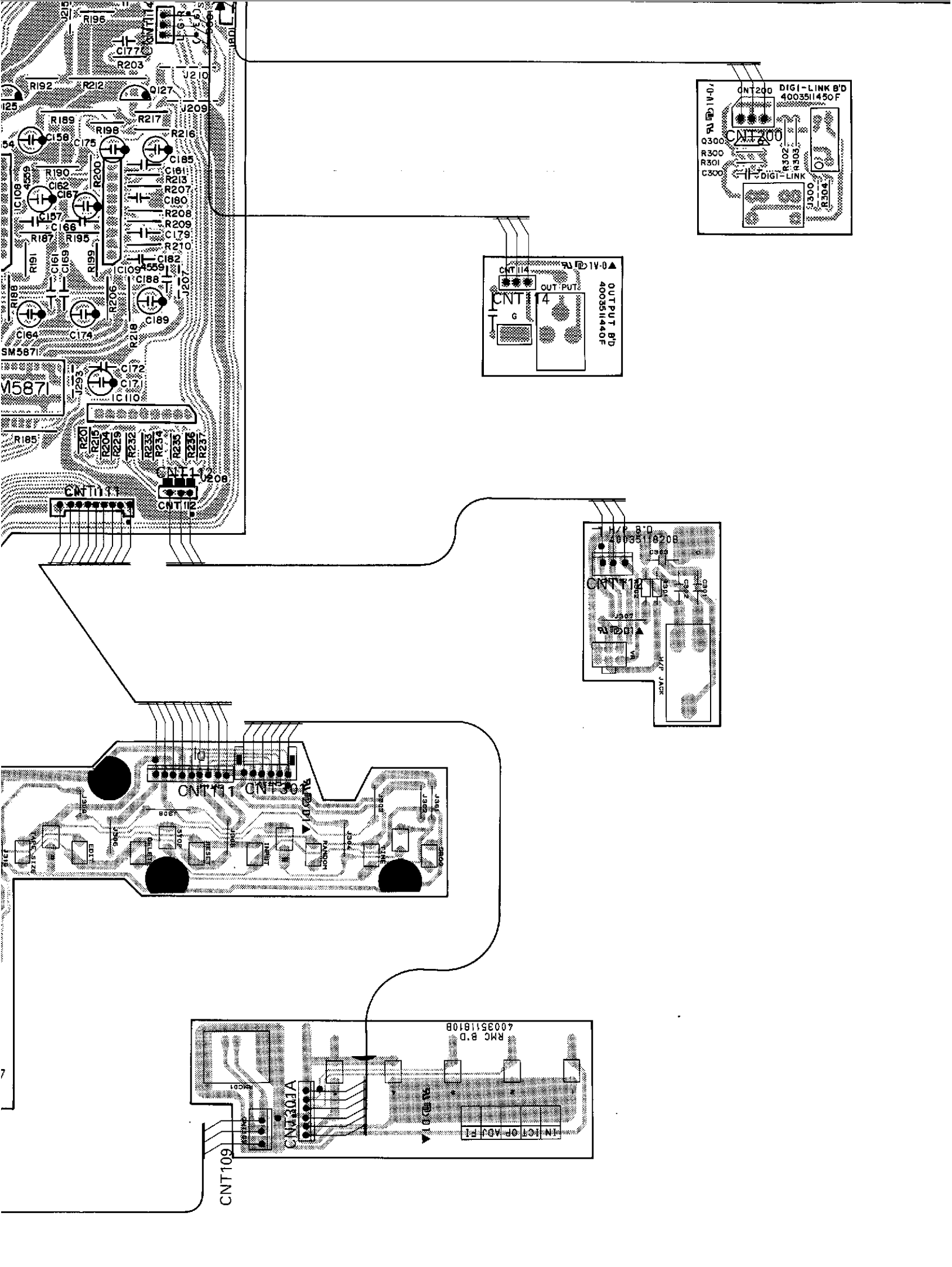

CNT110
CNT109
CNT108
CNT107
CNT106
CNT105
CNT100
CNT101
CNT102
CNT103
CNT104
TEST MODE
TEST 2
SW101
IC101
DWP
IC102
CXD1167
IC103
CXA1082
IC105
4558
IC106
4558
7905
7805
PLL
VR101
XT101
XT102
PLCK
GND01


To CNT101
CNT104
CNT103
CNT102
CNT101
CXA1081
IC104 CXA1081
CNT115
OPTICAL B'D
4003514300
CNT116
OPT101
CNT200
CNT114
OUT PUT
OUT PUT B'D
4003511400
SM5871
IC107 SM5871
IC110
VR105 G.
VR104 F BIAS
VR103 TG
VR102 FG
ASY
EF BAL
FE
TE


To CNT101
To CNT102


OPTICAL B'D
400351430F
CNT105
CNT105
R235
C209
OPT101
CNT200
DIGI-LINK B'D
400351450F
CNT200
Q300
R300
R301
C300
R302
R303
DIGI-LINK
U300
R304
CNT114
OUT PUT
CNT114
OUTPUT B'D
400351440F


CXA1082
IC101
DWP
IC102
CXD1167D
SM5871
PLCK
400351140OFMAIN B'D
1V-0
FL101
FRONT B'D
400351180OB


CNT200
DIGI-LINK B'D
CNT114
OUTPUT B'D
CNT111
CNT112
CNT110
CNT109
CNT201
CNT301
CNT202
CNT203
CNT204
CNT205
CNT206
CNT207
CNT208
CNT209
CNT210
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